

REMOTE IMAGING GROUP

30



NEWSLETTER NO.30

SEPTEMBER 1992

REMOTE IMAGING GROUP.....OFFICERS 1992

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Front Cover Photograph:

EGYPT and the NILE, HRPT NOAA image by Marciano Righini, I4MY.

Available on GIF Library Disk No.18 which contains other HRPT pics by Marciano.

FROM THE EDITOR'S DESK

JAMES BROWN



A quick check on the contents page will reveal another succulent selection of literary masterpieces for your delectation... I exaggerate slightly! A slightly slimmer magazine this quarter, but with the same variety of up to date news and reviews which keep us all informed even if we can't afford what's on offer! At long last we've a resident meteorologist to tell us what to make of the pictures we see, definitely no hurricanes in sight!

Something which I've noticed crops up from time to time in correspondence is the question of content and balance. Perhaps a few general comments on this theme would be of help, specially to any newcomers. Constructional articles are always welcomed, and it is often this area which is of greatest interest yet on which we receive the least number of articles. Imaginative and innovative ways to do the otherwise impossible, command instant appeal. There must be, for example, judging by correspondence alone, many members now with a 'Henry' loop Yagi. But the idea had been around for ages, then 'someone' comes along and demonstrates it works and we all think, 'well why hadn't I thought of that', and out comes the blow-torch and we've got the satisfaction of saving ourselves 'x' pounds. You may not be a computer programmer, but why be a couch potato?! Let's save money and concentrate on the things we can do ourselves. Show us a rotator system using a readily obtainable motor, or a phased loop yagi system that could make rotators redundant. So you can't get PDUS on a loop yagi - who says? What about two, or three? What about cascading LNA's? Have you tried it? I discovered the other day by a mad experiment that it wasn't absolutely necessary to have the dish LNA out of doors! After 60 ft of cable into the house I put the LNA on in the 'shack', and there were virtually noise-free APT pictures! Go out and challenge the experts by your own experiments, and then write in and let us know how you got on!

When it comes to reviews and the like, it must be understood that we are heavily dependant upon two things. Firstly, the manufacturers who are actually making new products, and secondly, on competent people who can write a fairly unbiased and objective review. I am reluctant to be drawn into an argument over past or present balance, but on the first point, clearly there is one manufacturer who is consistently coming out on top with new additions, and reviewing and detailing such items will invariable attract the

criticism from some that we are favouring that company unduly. I can only comment that the general feeling of others is that without such a company we'd still be back in the remote imaging dark ages! Success inevitably gets well aired in this newsletter. But any idea that we are in the pocket of just one manufacturer is totally untrue. At the risk of being boringly repetitious, editors have persistently asked for advertisers to supply their goods for review, and time and time again the plea has fallen on deaf ears. We are no longer willing to accept 'reviews' of 'vapourware' packages, as so often they stay as little more than wishful thinking, but if there is a genuinely available product, and a manufacturer is not ashamed to supply it for review, then you may be assured that it will certainly get the same treatment as anyone else's products, not withstanding how small a proportion of the membership may own a particular computing device. To the best of my knowledge we have never turned down anything offered and we definitely have no axe to grind for any one particular company, except those products which RIG itself markets, which are proven and tested devices, and have themselves have been subjected to extensive testing and reviewing before being let loose on the membership. Indeed it would be positively dangerous to set too much store by one particular computer or product. Companies have a habit of leap-frogging each other in the course of time, and some even die a death en route.

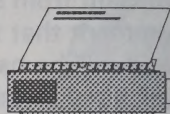
PC's tend to rule now by virtue of price and prevalence, but in another five years maybe we'll all be into Apple Macs, or Archimedes or some brand new all-singing, all dancing voice-controlled super transputer. Perhaps first thing in the morning you'll whisper gently in your computer's ear, 'Get a visual image for me of northern Italy', and that'll be it! A year in electronics is a long time! But once a major review has been undertaken it is unlikely that the same page space will be given to that item again, but ongoing comments from the experiences of other users are often helpful.

On the second point, It would be good to see some new names among our reviewers. All we need is some extensive details of your receiving set-up, computer/frame-store, and your willingness to work to a dead-line. But you must also bear in mind that a lot can hang on a review, so you must be able to write reasonably well, and be prepared to justify legitimate criticism. Perhaps you have a machine and satellite receiving system which very few others know about, again we would welcome an objective review. We look forward to a flood of offers!

Our thanks then once again to all our contributors in this issue. From waffle to weather you have earned our grateful thanks... JAMES BROWN

FROM THE MAKE-UP EDITOR'S KEYBOARD

MIKE GOODALL



At last! We have caught up. The June edition dropped on the doormats of our UK members in the last few days of May. Many thanks for all those who helped me achieve my first goal with respect to the Newsletter.

For any readers interested how we produce the RIG Newsletter...

James receives the copy, either in manuscript form (you will write clearly, won't you!) or hopefully in a popular wordprocessor format or ASCII text file format. The files are converted to Wordperfect v5.1 or laboriously typed in. These files, now in Wordperfect are sent by modem to me (from Wales to Cambridgeshire) and made up into pages in Wordperfect by myself. The final artwork pages for the printers, Abbeyprint in Spalding, are produced on a Hewlett Packard LaserjetIII.

The circuit diagrams supplied to James are normally scanned and reproduced on the Laser printer and tidied up. Rough illustrations are normally drawn by myself on a Windows drawing package.

The illustrations, taken from photographs or picture data files are processed by a firm called Colortone Graphic services Ltd. who convert the disk data files into screened bromides, and sent to Abbeyprint, who make up the final product. All 1500+ copies are delivered to Henry, and he and his family have to insert them into envelopes and stick on the name and address labels supplied by the Membership Secretary, Ray Godden. These are then sent to the local Sub-Post Office who lick and stick on over 1200 stamps. (Rather their tongue than mine!).

The deciphering of manuscript copy, typing and sorting out the pictures by James can take up to 100 hours per issue. The make-up and compilation by myself anything up to 200 hours, and the insertion into envelopes and labelling by Henry and his family, up to 10 hours. Not to mention Ray having to constantly update the Membership computer files to be able to supply Henry with a complete set of Address labels. As you can see, it all takes a considerable time, and any help, such as sending in copy and photos early, sending in articles in wordprocessor or ascii format (any PC format, preferably in Wordperfect) rather than manuscript or typewritten, really does help!

Our request for early copy has worked well and most contributors have obliged. The future deadlines are as follows...

<i>Cover date of Issue</i>	<i>Deadline for Copy</i>
DECEMBER 1992	1ST NOVEMBER 1992
MARCH 1993	1ST FEBRUARY 1993
JUNE 1993	1ST MAY 1993
SEPTEMBER 1993	1ST AUGUST 1993

These dates will be rigidly adhered to and there will be **NO** exceptions.

Advertisers copy will be required 7 days earlier than the deadline date.

Also remember that Members Private Advertisements are *free*. If you have any RIG-related equipment for sale, send in the details to James.

PLEASE REMEMBER... SEND ALL COPY FOR ARTICLES, READER'S LETTERS, ETC. TO JAMES BROWN. I only deal with the RIG Gif Library on a direct basis. For all enquiries regarding GIF viewing programs and suitability for your specific computer, or general computer problems, contact the appropriate member listed on the Helpline page.

The RIG GIF Library has been going very well, with lots of images coming in from home and abroad. Most are of the HRPT format these days, and some are quite stunning. Over 100 members have sent for copies of the disks, and the service is more popular than I had ever imagined it would be.

INFO...

We have recently received a copy of the Shareware catalogue of Amdromeda Software, PO Box 605, Amhurst, NY 14226-0605, USA. It contains mainly Scientific programs, including Graphics (GIF, etc.), Earth Science, Geography, Environmental Science, Electronics, Ham Radio, Astronomy, etc. From their reviews it appears that they have made a point of searching out the very best of the Shareware available on each subject, and many programs will be of interest to our members. If you can afford to call direct the number is 716-691-6731 (24 hours a day) and they accept Visa and Mastercard.

CHAIRMAN'S WAFFLE

HENRY NEALE



The Corporation Taxmen have got their eye on RIG! This could have serious repercussions if we make mistakes, even if they are accidental. We are not allowed to sell to non-members, which means that we shall have to have up-to-date membership lists with us at the rallies, and use them. It is not that we doubt your word, but this has become a necessity. One mistake and the group could become liable for Corporation tax on every penny profit we make! We must be extra diligent in all future sales, in order to protect the Group. We may have to go on to a membership number system in the future, but we will persevere in the meantime.

The Electronic Bulletin Board has come in for some criticism at times and I would like to give you a operators guide to it. General observations and comments follow. The use of colour slows things down somewhat and is best avoided. If your modem is a slow one - 300 or 1200 baud - do not attempt to download large files! Someone was downloading for 68 minutes one day! It's not so bad at 9600 baud because I downloaded a 500 kbyte file in 10 minutes. Just imagine the same file being downloaded at say 300 bauds! The BBS is very useful for small files on slow modems, but as soon as you take 10 minutes or more, reappraise if you want to continue! Someone used the board for 3 hours and 40 minutes in two days - in short sessions. I bet he wasn't paying the bill!

Passwords do save you about 15 secs, and it makes it a little simpler. The file you want to download has to be exactly specified, including the extension. If you are just browsing then download the index file, log off and read it. After deciding exactly what you want you can start again without wasting valuable pennies. Some people just do not seem to be able to activate it, - they ring in and it responds but they just do not seem to be able to converse and the call drops out. I am getting less of these recently and about 80 % are now successful. If you are uncertain of what's on the Board use the index file (already mentioned), the (P)rogram descript or the (F)ile keys. "P" gives you a description of the files that are on the Board and "F" gives the exact file names only. Initially we were having problems with the modem card because it did not seem to want to talk to some callers. We found out that even though there was a tone on the circuit all

the time it wasn't the correct guard tone. This was soon rectified. If we had been experts in the first place this would not have occurred. The number of calls to the board has now reduced and a usual day would see about 6 people using it with several more at the weekends. If anyone knows what the initialisation string should be for an HST PC Modem please let me know! - it would save several people a lot of headscratching!

You can upload to the BBS if you have something special. It places all incoming files in a special sub-directory - until I can look at them and move them to the Downloading part. The opening screens now contain a Satellite Status section from Peter Wakelin, which, like the Keplers, is usually updated weekly. Dave Cawley gets the data from the NOAA board and sends it over to our board. There is also a message handling system, but I am not over enthusiastic about it - even though it works. We have studied several EBB systems but they all seem to be too complicated and sophisticated. They all have many features that we just do not need. Some even need a doctorate just to read the Doc files! I have copies of Wildcat, Ezelink, Opus and Remote Access. The later was recommended by Ted Batts who runs his own Board in the London area. He offered to help us but I have been too busy with harvesting etc. to take him up on the offer. Currently, it would be nice to fix the problem of the people who cannot access it at present, and to smarten / tidy up the system.

It has been accessed from Western Samoa on the other side of the World as well as Switzerland, France, Belgium, Finland, Sweden, Scotland and of course Wales! It is very useful to exchange files between James, Mike, Dave and Mark. You don't have to wait for the Postman - they are there "just like that"! Calls can be made at any time of the day or night but my wife is not pleased when I get up to see who it is on the EBB! The 'Page Operator' works but is not very loud and unless I am in the RIG office I don't hear it. You can leave a message for me on the Board because I usually check it once a day. Other problems we have had have been with the 286 machine itself - it regularly locked up. The recent change of the Motherboard seems to have cleared the problem. There also seems to be a software problem, resulting in it not answering an incoming call. I am rapidly beginning to agree with someone that said operating a Bulletin Board was a full time job!

We had a lot of flack after the last newsletter was published. The price reductions caused quite a stir! These happened overnight and I was completely unaware that anything like it was going to happen. Dave rang me to ask how many PcSat3s and ProSatlls we had in stock. He told me

what the new prices were, and that he would reimburse us with the differences in purchase price of the units in stock. This caused a mild panic with the Newsletter team, and near coronaries in the process! If I had any tipoffs or rumours, I can assure you that you that I would have had a quiet word with you. To those of you that bought before the reduction my sympathy, but I didn't know. I don't think that I need sympathise with the many members that have purchased at the lower prices! It has made an enormous amount of difference to this years turnover! We exceeded last years turnover about the 1st of July! We look like going on to about a £70,000 turnover this year! RIG is making several times more profit than our Farm and I have to run both of them! (well not quite).

Due to the panics that we have been experiencing recently it has not always been possible to accurately forecast demand. It is always worth a phone call to check that the product you require is in stock. When an order is received RIG usually sends the products out the very same day where it is possible. Many letters confirm that I have done this, but I will add that Harvest time might be a temporary exception. I will do my best especially if they are straightforward orders. Orders with questions included always take longer and usually require a phone call. RIG will endeavour to keep stocks to cover most eventualities.

The whole area of Advertising is becoming a burden for our hard working voluntary labour force, and it is becoming obvious that we need someone to look after this area. We really need an Advertising Manager. If you live within 50 miles of say Welwyn Garden City, and have a flair for this type of work, let any of us know, and prepare to be quickly frogmarched into the post!

When Rallies occur at weekly intervals it gets a bit much, but fortunately it is not in my busy season. It is certainly keeping Mark Clarke busier than he expected. He hopes to have some good news for those of you that want to pay on Plastic. It has been known for sometime now that if you live overseas, paying our subscription is not an easy task. That might be a lot easier in the future. It will save on currency exchange charges and be a lot easier. He will keep you informed of progress in the next Newsletter.

Following the Rally rush, comes the story of the Timestep 2-channel receivers. We had - had being the operative word - 60 of them. They disappeared at the rate of 10 per week! I don't think that even Dave thought we could sell them as quick as that! They were such a very successful line that the committee is trying to get him to make - specially

for us - a multi-channel version. It might have a mechanical switch, might be unboxed, and will probably be crystallised for only 2 frequencies, to keep the price down. Again further details when available.

The crossed dipoles are also selling nicely. We are on our second batch and reports are coming in to say that they are very good, as well as being economically priced. I wrongly described them as droopy dipoles. They are standard ones complete with plastic bungs in the tube ends. We don't spare the quality; even at a price that would be below the cost of materials, if you bought them in one off quantities! A chimney lashing kit could soon be available, but it is heavy and would be expensive to post.

Dishes are becoming a slow moving line, and because of the difficulties getting them to rallies and then having to bring them home again, it may be "only to orders in advance" at rallies in future. If I can take them I will, but it does entail extra work. Whilst on the subject of Rallies, there is a small possibility of attending one in the North of England / South of Scotland area next year, possible Glasgow or Edinburgh. If you know of a good one please let our Rally organiser know and we will seriously have a think about it - but not until next year!

At the time of writing this Waffle (end of July) Harvest is nicely underway. I have completed the first batch and can report that the section where I had to put the fire out was completed without any reoccurrence!

I have had a few teething troubles (like the Bulletin Board) but apart from a few slipping belts and minor hic-cups nothing exciting has happened. I hope it stays that way! If our timetable for the Newsletter continues to be accurate you should have this Newsletter on or before the first of September. That is still my busy time, so I would be very pleased if I wasn't inundated with orders in the first few weeks, as I have been after previous Newsletters were posted. Getting the Newsletters out on time is no mean achievement. Full marks to the team members. Lets hope we can continue in like vein for the coming editions.

I did not get many offers for regional reps, only about 3, so that idea seems to have fallen by the wayside. If any member would like to know of other members in their locality we might be able to help especially if the others do not mind the publicity - that's why the question is on the membership form. It often helps to have someone to keep you on the right path even if you don't always agree with them. Cooperation and collaboration are very valuable when things are not going the way they should.

The RIG weekend has not progressed and is getting doubtful for next year. All these things take time and with the increasing amount of time spent on RIG work, my time is somewhat limited. I have some good officers, and they help, but even they cannot do impossibilities. There is still a lot of time until next year, so who knows?

The HRPT / PDUS Special Offer prices in the last Newsletter provoked a fair bit of attention. Many of you do not know what each one does or the differences between them. If I could explain this a little, it might help some of you understand it better.

PDUS

Primary Data User Stations

These systems use the data sent down from the geostationary satellites - Meteosat 4 at present. The data is sent down to these stations in a digital format. It is of higher resolution than the normal Meteosat transmissions and because it is in a digital format there will be very little noise in the images. The only noise present is that associated with the sensors and other system parameters that are outside our control. Virtually what you get is the maximum possibly achievable. What is achievable? Regular full disk IR, vis and Wv images every 30 minutes, or when available. There are also Northern section enlargements at maximum resolution. It must be remembered that maximum resolution is 2.5 km square at the satellite sub-point. That means that at the UK latitude allow something like 2.5 x 4.0 km. This is of a higher resolution than the Polar Orbiters in the APT format, and regular - you do not need a prediction package! Images can be stored and animated automatically. To receive good data without too many bit errors a dish of about 1.6 metres diameter is required but there won't be any tracking required after initial alignment.

HRPT

High Resolution Picture Transmission

I call this the poor man's Landsat. It is possible to get down to 1.1 x 1.1 km resolution at the satellite sub-point. The signal sent down is also digital and is sent down at an enormous data rate. A full pass would fill about 65 Mbytes and is the source for the APT data that many already receive. I won't go fully into the system but a dish about 1 metre diameter is required and it needs to be steered accurately. This may be done by hand or by computer / software. Usually the data is stored and processed later to produce the frames. The data is sent down in 10 bit accuracy and this allows heavy processing to reveal information from small pixel value changes. The data from 5 sensors is sent down in serial form from each

pixel in turn. This results in a very large amount of data being stored unless some of it is ignored at the time of reception. Both the HRPT and the PDUS systems really warrant further descriptions to give them the credit they each deserve.

That's all for now Folks - must get the combine moving - it looks like rain!

Best Wishes, Henry

NEW METEOSAT SCHEDULES

Dave Cawley of Timestep has kindly sent in the data and artwork for the new schedule that has been issued by ESA for the Geostationary satellites Met3 and Met4. It is reproduced as a centre pull-out in this issue.

FOR SALE...

AVT MASTER and OVERVIEW for the AMIGA, gives Rx Weather Fax Plus Slow Scan TV and HF FAX, Tx & Rx. Cost £400. Sell for £200 ONO.

*F. Chilton, 127 Nicholls Field, Harlow, Essex CM18 6EB
Phone Frank on 0279 420755 after 9 p.m.*

FOR SALE...

YU3 UMV Framestore. 4 pages. Built-in PSU. Uncased. Henry's suggested price £200 but I am prepared to haggle.

*Grant Dixon, Kyrle's Cross, Peterstow, Ross-on-Wye, HR9 6LD.
Tel: 0989 62715*

A FRAMESTORE IMAGE PROCESSOR

Peter Hayes, GM3RAO

The computer is rapidly becoming the standard tool for weather satellite imaging, offering colour, animation and archiving facilities which the humble framestore can't hope to match. However, many amateurs still rely on the framestore to display their pictures and with the new improved designs soon to be available, there is an increasing need for framestore image processing. One area where useful picture improvement can easily be carried out is in grey scale alteration.

There are two possible ways to alter the grey scale, one is to pass the audio signal through a compressor/expander chip such as the SSM2120 dynamic range processor, or the NE570/571 compander. This can give useful results, especially on NOAA IR images where moderate expansion can give quite remarkable results. Pre-record expansion can also help reduce the effect of tape dropouts, the "flecks" often seen on cassette derived images. This technique can also improve pictures printed out on wet paper fax machines as the paper used in these machines has a limited tonal range.

The alternative technique is to process the digital signal in the framestore memory. It is possible to process the signal while being read into memory, but it is much more satisfactory to leave everything as it is and apply the processing to the signal as it is read out of memory. This way the amount of processing can be altered at will to suit each individual image.

All framestores have a Digital to Analogue converter (DAC) as the final stage, converting the 8 bit digital words read out of memory into a video signal. Fig 1 shows how memory data can be intercepted at the input to the DAC, and Fig 2 shows a block diagram of how the processor is connected up. The 8 bit data read out of memory forms the 8 bit address for a 256 X 8 eprom. For each of the 256 possible combinations of 1's and 0's coming from the framestore memory, a different memory location within the eprom is addressed, and gives a pre-programmed output on the eprom's 8 data lines. This ability to pre-program what the eprom is going to give out forms the basis of the image processor. This new 8 bit data line is fed to the DAC input replacing the original data lines now re-routed to the eprom's address inputs.

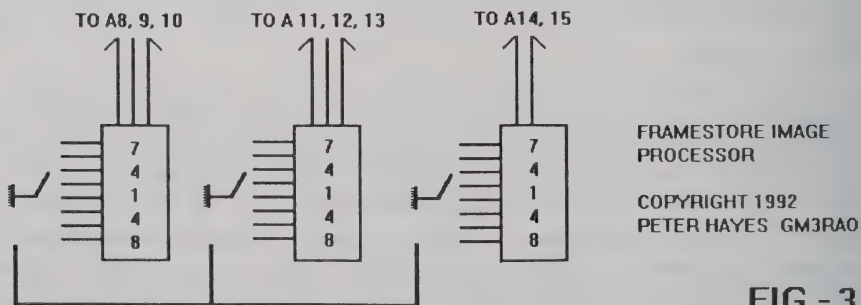
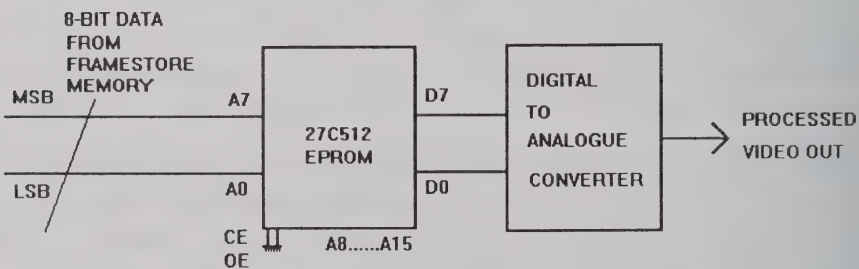
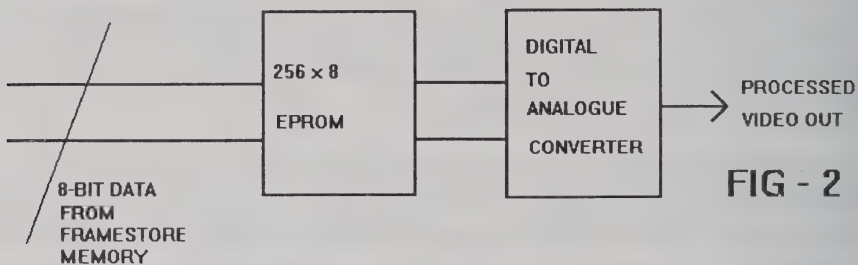
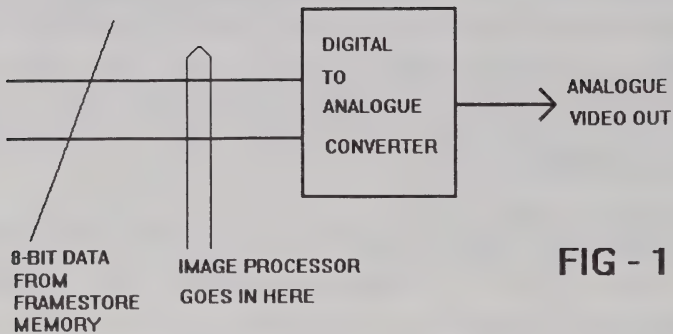
An example will show how the eprom can be used to alter the image in the framestore. Suppose the address line is carrying all 0's, which would originally have represented black, and now addresses eprom location 0, and

let the corresponding output data from this eeprom location be all 1's (255 decimal), representing white. Now, if when the memory data output carries all 1's (white) the corresponding eeprom address gives out all 0's (black), and if with intermediate data values the eeprom gives out 255 - data value, you will in effect have turned the picture negative. Not perhaps terribly useful, except if you're receiving Meteosat Primary, and need to invert the picture, but it serves as an example.

Obviously a coherent input/output relationship is needed to produce sensible results, and this will usually correspond to some mathematical algorithm. For example, to "black stretch" you could arrange for the output to be the exponential of the input. Alternatively, to emphasise clouds keep the output data values lower than the input until the input level approaches 150 or so at which point you start to increase the values so as to open up the white end of the curve. Some work with pencil and paper before programming your eeprom usually works wonders.

Another possible application is to remove the white "sky" associated with Meteosat IR and WV images. The "sky" (space) is shown as white as space is supposed to be very cold, although if there is nothing there it can't have a temperature! However, as a variation, it is possible to remove the white sky and replace it with black. Assuming your framestore is being fully driven, the sky corresponds to all 1's, (255) and if you now make the processor replace this 255 with 0, you will turn the sky black. Some experimenting may be needed to ensure all the sky is blacked out as any noise on your signal may reduce the 255 to something a little less. The off-screen photo shows an example of this application and is of a Meteosat Primary AI (IR) image, similar to D2, and you will see that the customary white sky is now black. This picture was obtained with a framestore fitted with the image processor, and no computer in sight! Whether you would want this particular effect is purely a matter of taste. I find the screen easier to look at without the glaring white surround, and it's easier on the monitor too!

A full circuit is shown in Fig 3 and includes the rudiments of a "bank switching" system. One image processing algorithm requires 256 locations in the eeprom, but since even the smallest available eeprom, the 2716, 16K eeprom, can contain 8 different algorithms, it is possible to customise a large eeprom to give yourself many different image processing possibilities. Using the bank switching system you can switch high address lines to give you sectors with processing for NOAA visible or IR images, and other sectors to give various Meteosat algorithms, and the lower address lines then select



the individual algorithms within the sectors. For initial experiments you could use a hex encoded rotary switch which will give you 16 positions, tying unused eprom address lines to ground. This will allow you to get the hang of what's involved with minimum hassle as the address coding is done in the switch.

Someone once said "there's no such thing as a free lunch", and in this case the problem is that eproms are relatively slow devices; in other words, they don't respond very quickly to address changes. In practice, this shows as "edgy" pictures when working fast as they do with large framestores. If your display is 512 wide you should have few problems, and if you have a "zoom" facility, the effect will reduce or even disappear altogether on close-up views. A data latch between the eprom and the DAC can get round most of the problems, but the best solution is to use the fastest possible eprom. The fastest eprom in Maplin's catalogue is the 27C512 (and larger) range with a speed of 150 nS. and appears to be fast enough to cope with most images. This eprom can store 256 different image processing algorithms, which should keep most people busy programming it for some time!.

It should be easy to "retrofit" a framestore using a small piece of veroboard to carry the eprom and the bank switching circuitry, especially if the DAC chip is socketed. Remove the DAC and use a "wire-wrap" socket suiting the DAC so you can use it to plug your piggy-back board into the vacated DAC socket. This allows you to access the original data lines and to output the processed video without major demolition work on the framestore PCB, and it also allows you to remove the processor if you find you don't fancy it. You may also need to pick up a feed of +5V. The DAC can be transferred to this new board and the operation is over, apart from programming the eprom. If you're intending to experiment with various processing algorithms it's advisable to use a "zero insertion force socket" for the eprom so repeated insertions and removals won't harm it. The socket costs more than the eprom but it's worth it!

I don't pretend that this processor can compete with even the simplest of computer programs, but it does provide some processing for framestore users. Anyone contemplating this addition to their framestore can contact me at the address given on Page 43 of RIG 25. If you don't have an eprom programmer, I can supply a 27C512 with a number of pre-programmed algorithms for about £10 including p&p.

Peter Hayes.

THE TIMESTEP PRIMARY DATA SYSTEM

James Brown

"Are you sitting comfortably? Then I'll begin!"

Yes it's Primary time folks! No, not the primary you're thinking of when you were just a mixed infant, but Primary as in METEOSAT's PDUS (Primary Data User Station) transmissions. It is tempting at this point to get straight into a review of the system supplied by Timestep, particularly as it is in my opinion, quite the most spectacular of their products to date, but for the sake of newcomers, I'd better begin a bit further back with a quick introduction to the capabilities of geostationary satellites. Old hands can skip this bit if you're sure you know it all!!

The current METEOSAT geostationary spacecraft series actually has the capacity to transmit a number of different data streams. The five main outputs being:

1. MDD (Meteorological Data Dissemination). This is a whole range of integrated products including weather charts, images, numerical information etc., sent down in one data stream. And if you're wondering why you've not seen much of this mentioned before, it is also an encrypted service for which users have to pay - a lot!

2. RAW data transmission are the unadulterated complete scans of the whole earth (as seen from the satellite) sent down to Darmstadt every 30 minutes, from all sensors at maximum resolution. Contrary to popular opinion, it reveals that there are not funny marks on the ocean's surface showing latitude and longitude and coastline outlines!

3. WEFAX is what most of us grew up with and cut our teeth on, but WEFAX is actually processed from the RAW data transmission. Digital data is converted into analogue data and as most of us know, transmissions are usually limited to selected 'windows' from a single sensor. Resolution varies depending on the size of the area transmitted, and although an FM carrier is used, the signal is of sufficiently low strength that the quality of imagery is substantially affected by the signal to noise ratio of the user's receiving equipment. Any attempt at contrast expansion for example inevitably causes noise to be amplified to the degradation of picture quality. Even using a 2 metre dish and a good LNA, and being able to virtually put a ruler across the peak amplitude of the signal as seen on a 'scope, the A/D

converter in your display system will detect enough variation to hunt between levels. If you have PROSATII, try looking at the pixel values on a saved image from a test image or admin slot, and you'll see how much noise is still left.

4. DCS (Data Collection Platform re-transmission System). From time to time in the inter-picture period of channel 1 transmissions you may hear a sharp squeak in your speaker, as if your cat had inadvertently nuzzled up against your hot soldering iron. This is digital data relayed via Germany from countless tiny buoys and remote gauge transmitters which have sent up their data comprising, temperature, rainfall, current movement etc. METEOSAT 4 has 66 channels dedicated to these little transmitters. The devices identify themselves and then a string of data follows, much of which is meaningless to the likes of you and me, but is the sort of thing which the Cray twins (computers!) in the Met office thrive upon.

5. PDUS, which is the subject of this article, is pure digital imagery. The data comprises entirely of 0's and 1's in binary code, sent at 166kbits every second, and up until fairly recently has been the domain of only a few determined souls, who have not only battled their way through the problems of getting the right hardware, (See Peter Hayes' saga!) but also through the sophisticated encoding of the data signal which unlike HRPT is so complicated that data from LANDSAT is actually easier to decode! However, my feeling is that this is all about to change with this latest flyer from the Timestep stable.

Let me say at the outset that the system I have been sent to review has given some of the most awesome pictures I have ever seen. But in order to appreciate its capabilities, we ought to be aware of the potential imaging capabilities of the satellites, and then make an objective assessment as to whether the equipment does it justice.

Every 30 minutes the total earth view image is transmitted. Effectively 2,500 pixels square, it can take up to twelve minutes to transmit, depending on how many sensors are in use, but at the end of it you've got a large data file to play with. All the coast-line grids and lat. long. marks known as Map information is also sent, but separately so you the user can decide whether they're a nuisance or a help. If you look at a METEOSAT dissemination schedule you'll see these PDUS transmissions on channel 2 beginning with the letter 'A'. Hence these are known as the 'A' formats, and the letters that follow indicate the sensors in use. But more about that later.

Also, once an hour, an area roughly from Mid-Atlantic across to just south of Suez, and north to near the pole is transmitted at maximum resolution. That takes just 3 and three-quarter minutes. And about half an hour later if you want a quick short file, a similar area is transmitted at half the resolution. These are the 'B' formats.

Although raw data transmits all sensor outputs, to fit all the transmissions into a tight schedule, A formats (unlike the BIV) have the visual output from only one sensor, so resolution is 5km's. But near mid-day EUMETSAT lets rip with a double visual image of the whole world. It's almost 30 Mbyte in length and takes about 24 minutes to transmit, but what amazing clarity it gives, and the Timestep system copes admirably with this huge file. But transmissions don't stop there, there's more! EUMETSAT now owns 3 operational geostationary satellites, to become 4 in September 1993, (Pause while US readers grind their teeth!) and whilst 'Johnny No 5 is alive' METEOSAT 5 is still in disgrace and has been relegated to MDD transmissions for some months to come, METEOSAT 3 chugs happily away over the mid-Atlantic with a regular PDUS and APT service.

Every three hours METEOSAT 4 disseminates a half-resolution but complete disk PDUS image relayed from METEOSAT 3 and the detail from South America, (overhead) and as far away as California, is excellent. These are marked 'LX..' formats. We must hope that the remaining GOES-7 doesn't go down the drain or else the plan is to relocate METEOSAT 3 to 100 degrees West! However, Primary Data images would probably continue to be relayed. The Timestep system copes with live METEOSAT 3 PDUS as well as with METEOSAT4.

To give some context to this review, for about eighteen months I have had the loan of a PDUS system from a good friend up north, and so already had quite a bit of experience of PDUS transmissions. It was the amazing quality of the pictures that led me to hope that one day PDUS would be within the range of our ordinary RIG members. But having had the experience of operating a PDUS set-up I was also aware of the greater problems in getting an adequate s/n ratio and of the need for precision timing, and spot-on programming to decode all the formats. So how does the Timestep system compare with the system I'd been using? Would the receiver side be sensitive enough? Would the software cope with all the various formats and sensor outputs?

I was tempted at this point to say wait until the next issue to find out, but that would be cruel so here goes...!

The first shock was the installation. I had mentally set aside a day to get everything sorted out and up and running. It took about ten minutes! A few minutes to plug in the card, a few more minutes to screw up the LNA and cabling, and then there was the receiver. I looked at the 7" by 5" box and wondered if there was something missing! Software installation ran for another couple of minutes, and that was it. Ah, I thought, but there'll be the need to twiddle knobs, set all sorts of conditions to count lines, configure for the different formats etc., etc..... Well I selected receive on the by now familiar 'Timestep' pull-down menu and a few minutes later a totally noise-free picture built up on the screen, and that was it! On closer examination it became clear that the software had entirely automatically decoded the file header information, decided which sensor information was being sent, what size the picture was, and correctly displayed the information. The programmer can be forgiven for opting to put the data directly on to the hard disk, as very few people will have chip memory of over 14 mbytes to cope with the 'A' formats!

The receiver has a meter which is switchable between signal strength and tuning. A front panel I.F. gain control handles different pre-amp sensitivities, and by turning down the wick allows for final tweaking of the dish position. Two LED's glare balefully at you indicating power (drawn from the PC) and data capture. Switches allow the receiver to be on or off, channel one or two selected for reception, which is important not only for future possibilities, but sometimes if a satellite power amplifier fails, transmissions may be switched to the alternate channel.

There is a tune control which I imagine sets the internal VCO, allowing for temperature fluctuations. I'm not sure if that won't be deleted on subsequent revisions of the receiver, but it only really has a use if you're using the receiver in a particularly cold place, and want to catch a transmission within a minute or so of switch-on. Otherwise set it and forget it. At the rear there are numerous inputs/outputs, I.F., the data 'eye' to be monitored on a 'scope, power, TTL data, a 5 pin DIN for connection to the PC card, and an 'F' connector input for the aerial. Did I hear the sound of a purist's eyebrow being raised? An 'F' connector you say - not an 'N'? Alright, I admit it, I thought, black mark there Timestep... that was until I did a little test. I run good quality UR67 up from the dish, but I laid in a length of CT100 with 'F' connectors, and 'blush' the gain shot up! I checked up in a Maplin catalogue also for the relative cable loss factors, and there it was in black and white. The fact that CT100 is 75 ohm and 'F' connectors are used doesn't seem to make much if any difference. Maplin also do a CT125 which has even lower loss!

The LNA which came with the receiver is a two stage RF design in a water-proof box, with a built in filter, which not only sends a cleaner signal up the cable, but may become obligatory if the new satellite allocations get taken up. The PC card is a 16 bit gold-plated job with a number of custom chips, and no sign of last minute mods. There are no pots to twiddle on the board, and just a single DIN plug and cable carries power, data and indicator lines.

Having access to another PDUS receiver at the time of writing this review, I can confirm that the card and software worked flawlessly with a third party receiver, though the Timestep receiver was marginally more sensitive.

Some time ago I built up a RIG LNA (pre-HEMPT) version, and without any optimisation this has also proved pretty successful, though again, not quite to the specification of the Timestep LNA. Another LNA on loan produced similar results to the Timestep version. So compatibility doesn't seem to be a problem.

One of the fascinating things about the system as supplied is that it is actually easier to operate than any other APT or HRPT system. It really is simplicity itself. No aerials to track, no meters to check, no worries about setting up for the right satellite etc. Just point and go! I haven't touched a knob for months now, and I'm getting withdrawal symptoms.

Everything is done via the mouse, and the pull-down menus. So what's on the menu tonight waiter? Well, dish of the day is now a 1.6m bare minimum, and something bigger would provide a useful margin for slightly deaf pre-amps. And don't forget to paint your dish a matt colour or the LNA could quickly end up as roast of the day! I am reliably informed that Henry has supplies of suitable dishes at very reasonable prices.

For the hors d'oeuvres: Often METEOSAT is sending several sensor outputs together, and you can preset which output you would prefer to appear on the screen as the transmission is in progress. But if you opt for visual and it is the night-time, the system is intelligent enough to override the choice. You can also opt for gridding and all the fiducial marks to appear, and for automatic inversion of infra-red pictures to display white as cold etc. A necessary switch, as just to be awkward, the LXV format is sent in the inverse sense. The method of zoom can also be set for either pointing with the mouse, and then zooming in around that point, or by the familiar 'box' method, whereby the mouse picks up a roaming rectangle and once positioned the section can be zoomed. The point option had a small annoying bug on it, but I would guess that this will be swiftly fixed.

The main course: Well, having captured a transmission, you'll want to look more closely at a particular area. The zoom system is quite the best yet, homing in with ever increasing magnification to quite chunky blocks if you so wish. Zooming out follows the same route, and a nice refinement is that while the system is running it remembers your choice of zoom areas, and you can return the same route just by quick function key presses. If you're zooming in from a big file then picture build-up is not fast. The files are saved as raw data, with everything included, a big plus for future examination etc. But the penalty is that the system has to comb out the correct sensor information and format it for your graphics display.

On my 386SX-16 it could take thirty seconds to build up a picture from the largest files. If you've a hard drive which is quite full, you may occasionally find that the free space is so fragmented that the system is unable to write all the data to disk in the time allowed. All that happens then is that you may get a missing line or two. The system carries on, rather than crashing, and mercifully no harm is done to the drive itself. This is quite rare, and can be avoided entirely by occasional use of utilities like NORTON or PC TOOLS which have the ability to de-fragment files and free space. To give you an idea of the excellence of Peter Arnold's programming, EUMETSAT actually began a transmission of a brand new half-resolution visual relay transmission from METEOSAT 3. Lo and behold, the programme detected it, and displayed it in the correct format without my doing anything. But be warned, PDUS is hyper-addictive!

Being able to examine huge areas of the earth in detail down to 2.5 km's across at the sub-satellite point at almost any time of day or night leaves APT cold. Even HRPT gets left behind when you get to examine the amazing Arabian cloudless low pressure systems, or track in detail the huge equatorial hurricanes. Already using the METEOSAT3 relay I have watched in amazement the development of several enormous hurricanes off the coast of California, unavailable to my WEFAX receiver, either direct or on relay. Study the area of Newfoundland where the cold waters from Greenland meet the warm Gulf Stream, and using a colour palette watch how the beautiful fronds of warm water penetrate the colder parts. Follow the Met office's latest project in monitoring the semi-permanent cloud sheet near the Azores, thought to hold the key to a great deal of the temperature of the Atlantic, and consequently the delicate knife-edge balance between ice-age or green-house.

The list is endless, and it's all there every day, every hour at the push of a button! But let me sound a note of warning. Those of you who anticipate

some dramatic increase in resolution of pictures of the British Isles are going to be disappointed. The big gain is noise-free pictures, available at full resolution every hour, but due to the curvature of the earth, resolution falls off to about NOAA APT levels by the time you reach 50 degrees north, and it continues to fall almost logarithmically the further you move out from the sub-satellite point. For examining ice development in the Barents Sea for example, the METEORS are irreplaceable. For this reason I cannot agree with the recent Timestep advertisement, and in particular the reference to the temperature of the Nile near the Aswan dam, measurement is taken via the infra-red sensor which begins with a 5km resolution, and is certainly worse than that by the latitude and longitude of the Nile. However, it is perfectly true that you can see the water very clearly, and the edge of not only the Aswan dam but also the dam at Khartoum as well.

Image processing continues with the familiar colour palettes and setting procedures, which I've never found easy, but which do have the advantage of being enormously flexible, and I've been able to create some trick palettes for the visual pictures which could not be done by conventional image viewers like VPIC. Equalisation is there, which extends the usefulness of the visual images well into the evening. On WEFAX the British Isles is virtually in darkness after 1800, but on PDUS there is still useful information in the Summer an hour and a half later. On noise-free infra-red images, equalisation produces some impressive detail of river valley temperature contours with no loss of detail.

Images can be saved in three ways. The complete raw data file, a marked section for viewing in SATSHOW, or the ALT-S which produces a .SCO file which once renamed can be viewed in VPIC. The section size can also be set for possible export into PCSAT3 or PROSAT2. I tell you, the number of images that you're just dying to keep as raw files make you long for the day of cheap mass data storage! A further advantage of opting to save as a raw data file is that every transmission includes an admin bulletin. So pop the file into XT or something similar, and there's your admin message any time you want it.

I understand that before long, an upgrade will be available with the ability to read the infra-red temperature detail, and it will use slicing techniques similar to PROSAT2. However the difference here is that because it is digital data, the temperatures revealed will be accurate to better than 1 degree!! Imagine being able to keep track of long term ocean temperatures to that accuracy! See the green-house effect as it happens from 36,000 kms out in space...!

There's also the latest printer dump routines activated with ALT-P, for lasers and HP Deskjet printers, with a pretty fair dithered print out.

Now for the sweet course: Well how about animation surprise! Forget everything you've seen before. While other software houses are still trying to get animation for their graphics packages, Timestep seem to have stolen the lead with a 256 colour 640 x 480 animation which has to be seen to be believed.

Choose the world or opt for a more detailed examination of an area of your choice. Zoom in while the animation is running, add colour to cloud to identify storm activity, watch while milky white clouds drift effortlessly across an azure blue sea, brushing against discreetly coloured green land masses. Some clever programming and a special palette has ensured that the ocean remains blue and the land green, whilst still reflecting changes in the respective temperatures of these bodies - very clever! Or go for your 64 grey-levels if you must, and just to cover every eventuality, you can add or subtract map information. Animation continues even while receiving the next picture!

There are no times to set, the programme is entirely automatic..Phew! The only snag is that not every video card can do the bank switching which permits the trick effects of animation. The ET4000 1 Meg cards can, as do the Orchid Fahrenheit and the latest Western Digital VG-8000 card. You'll need some extended memory as well. I have 5 Meg of RAM all told, and I can get 11 images animating direct from memory.

There is also a larger edition of the animation programme also available, but as it requires at least 16 Meg of RAM, it'll be a long time before I can review that!!... Do you want coffee?... Well the latest edition allows a choice of animation between infra-red and visual AND water vapour, so you can become a nowcaster with almost as much information at your finger tips as the men from Bracknell.

IN CONCLUSION

This must surely be the system by which all others will be judged. At the moment the competition, if there is any, has been left standing. A complete PDUS receiver, a card, software, AND the animation programme at the present price, has got to be the steal of the year.

Well after such an enjoyable meal, should we leave a tip for the chef or waiter? No broken crockery! (System crashes!!).

But what about the manual I hear someone ask? Have they improved it? What manual?!!

There is what I would call an operators guide, which covers everything you need to know about using the system, and it does have an extra page or so detailing the various possible formats PDUS could receive, with their resolution etc., but I'm not sure you could call 12 pages a manual! It is adequate, but if you want to know more about METEOSAT's instrumentation, or file-header information etc., then you'll have to write to EUMETSAT itself.

But that aside, it doesn't prevent me wanting to leave a big tip, and here it is...If you've room for a bigger dish - go out and buy it!

INFO... MARTELEC RECEIVER

We understand that at the time of going to press, the MSR40 Receiver advertised by Martelec in the last newsletter, is not yet available.

FOR SALE...

Rhode & Schwarz SHF Signal Gen. 1.7GHz-5GHz.
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A TWIN TURNSTILE FOR APT

Mike Goodall

The turnstile antenna has been with us for many years now and has been the standard antenna for NOAA and the Russian Meteor series satellites when receiving APT. It basically consists of a cross dipole with a phasing harness, plus another two cross elements, normally spaced $3/8$ wave from the fed elements. It is normally mounted pointing straight up.

This arrangement works fairly well, giving coverage on NOAAs from the top of Scandinavia down to the North of Africa. When using PCSAT3 or ProSatII you will get around two thirds of the screen filled before the signal drops out. On the Russian Mets you will get a fraction more.

This arrangement was used for a year or more at my location with good results. Then I got to thinking... How do they get these pictures of Greenland and beyond, with no noise on them. I had heard that a few members do use multi-element beams, and track the satellites, but a two-way rotator system and the necessary time involved in tracking each satellite pass put me off this idea.

I wondered if a turnstile pointed at the horizon would do the job. One of the RIG models was duly purchased and erected, with it's own downlead, and joined to a switchbox enabling me to switch between the new antenna and the original one that pointed straight up. The new aerial was pointed to the north, and the first Met was received. As soon as it came over the horizon the signal was heard, and within a few seconds a noise free pic was seen on the screen. The signal came up to several microvolts within a minute or two, and did not start to fade until the satellite was over Spain! When I switched over to the original aerial the signal continued as usual until it faded over northern Africa.

I was amazed! How easy it was to receive the whole pass with such a simple aerial system. Another turnstile was purchased and mounted pointing south (the original was a quickly lashed-up home brew job and due for retirement). It was found that the best arrangement was to elevate them both approximately 30 degrees from the horizontal. The turnstile with $3/8$ spacing has a beamwidth of around 90 degrees, but of course has more gain when pointed direct at the satellite. 30 degrees seems to be the best compromise, and allows for a good signal from the horizon to well past Britain, when the other aerial can be switched in.

Another bonus is the lack of drop-outs in signal often experienced with the single straight up aerial, although the occasional loss of phase over a few lines may still occur when the satellite is on an almost directly overhead pass. I have received many complete passes without a single drop-out. The signal on a near overhead pass now comes in well above Spitzbergen (Island of Svalbard) and north of Greenland and does not fade until well into northern Africa.

The NOAAs nearly fill the screen on ProSatII and the Mets are too large for the screen memory (it's best to loose the Africa end as this is the less interesting part of the pass).

The next experiment was to try and receive those north grazing passes which go close to the North Pole (normally heard as a few bursts of activity, and previously considered a nuisance). By leaving the northern pointed aerial switched in and rotating the pole slightly they were received, and almost noise free. The top of Greenland, Spitzbergen and that crescent shape piece of land at the top of Russia (Novaja Zemla) came into view. Bearing in mind that the majority of the pass was only 1.5 to 2.7 degrees above the horizon, I was amazed.

By tracking the aerial north to south the grazing eastern and western passes were also received well. It is not necessary to continually track by hand; three or four changes of position over the whole pass are normally sufficient. I wondered why I had not thought of this system before!

A word of warning about switching aersals. The original system used an old diecast box with three BNC sockets and a Mains type toggle switch. (Not the normal type of switch used for VHF but it did not seem to induce any loss). This worked very well. When I tried a good BNC microwave antenna relay I had problems. There was leakage between the two signals (probably due to their high signal strength, when overhead) and patterning was experienced when over Britain. A return to the old switch box cured the problem.

I suppose one flick of a switch is not too much to ask for a continual noise-free pass. Surprisingly, there are very few pixels of information lost when the switch goes over, and it may take you some time to locate the exact spot on the picture.

There may well be other quite capable antenna systems that will produce the same results, but I doubt at the same low price. Incidentally you can't

join the two downloads together to avoid switching. You will get all sorts of fading and patterning problems. For those of you who only take virtually overhead passes, the beauty of this system is that you can set the aerials pointing north and south and forget them. It is only with passes well to the east and west that you will need to track.

Details of the Turnstile crossed dipole aerials are on the Rigshop Corner page.

INFO...

Many members may not know that the European Space Agency, of which Britain is a member, publishes a number of books and quarterly newsletters on a variety of subjects related to our hobby. You will be amazed to learn that these are free for the asking! The most relevant ones of interest to us are...

Earth Observation Quarterly *(Covers Meteorology, Remote Sensing, etc.)*

Preparing for the Future *(Covers the latest in the space scene)*

ESA Bulletin *(Covers all space projects, and remote imaging, around 130 pages!)*

ESA Journal *(Covers same as above, also around 130 pages)*

Columbus Logbook *(Specifically for the future Columbus Project)*

The above can all be obtained free of charge from...

ESA Publication Division
ESTEC, Keplerlaan 1
2200 AG Noordwijk
The Netherlands

Once you are on their mailing list you will receive them until you tell them otherwise. A mass of free information for the cost of one 24p stamp!

AUTOMATIC ACQUISITION OF HRPT IMAGES

Stephen C. Padar, Sarasota, Florida

I had previously reported on the automatic acquisition of APT images via a DAT recorder in a previous issue of RIG. This method is highly reliable in producing images of a quality indistinguishable from an image acquired in real time from the satellite.

This method cannot be used for the reception of HRPT images. Fortunately there is another reliable method of acquiring HRPT images completely automatically. Since most of us have to work for a living and cannot be home for the satellite passes, totally automatic and unattended acquisition of HRPT images means the difference between having images every day of the week or only on weekends.

I have had experience in HRPT reception for about a year. I am located in Florida on the shores of the Gulf of Mexico. My 4 foot diameter solid aluminium dish is looking over the top of the second storey of my house and has an unobstructed view in all directions. The rotators are Yaesu 5600 Az-El rotators and the pole supporting them is well braced with guy wires and turnbuckles. Do not be tempted to use larger dishes as they are much more difficult to handle. Larger dishes would require a more expensive rotator system and their look angle is narrower requiring more precise guiding than the smaller 4' dish. A 4' dish is very adequate! The Quorum feedhorn is connected to a quadrature combiner and a Greg Ehrler LNA (0.5db noise figure). The output of the LNA is then downconverted by a Quorum downconverter to 137.5 mHz, and this is the signal seen by the Quorum receiver in the computer. The bit sync card is from Timestep, and so is the HRPT software. The computer is a 33mHz 486 with 8Mb of ram and a 210 Mb hard drive, 250 Mb tape backup and 44 Mb removable hard drive cartridges.

I have a second computer, a 25 Mhz 386 that runs InstanTrak, the satellite tracking software which, in turn, through the Kansas City Tracker controls the rotators. The Kansas City Tracker is an IBM board with software that is seamlessly integrated with InstanTrak. It can be invoked by a pop-up menu during InstanTrak and can be configured to calculate azimuth and elevation offsets to correct slight dish misalignments. This saves many trips to the roof with wrenches and compass to realign the dish. One problem with the Kansas City Tracker is that on a direct overhead pass the programme does not anticipate the necessity for turning the dish upside down. Such a feature would prevent the annoying loss of signal when the

dish has reached the limit of its north or south excursion and has to stop tracking while it makes a 180 degree turn to reacquire the signal.

Tracking accuracy has to be about 2 degrees but it seems that vertical misalignment of the dish is better tolerated than azimuth misalignment. The Keplerian elements should be, ideally, no older than one week. I obtain my elements through the Dallas remote Imaging Group via a 9600 baud modem. These are automatically ingested by InstanTrak. I also set my computer clock daily through the modem via InstanTrak. My computer is frequently 6-7 seconds behind the correct time; not tolerable on HRPT tracking.

I usually set the computers up in the morning. This takes only a few minutes. I turn the screens off to save the phosphor. In the evening I return and examine the pass or passes, since one can capture several passes of the same satellite. One can obtain images from only one satellite since the frequency has to be preset on the receiving computer and the satellite has to be selected on the rotor controlling computer.

What have the results been like? They have been quite satisfactory but not perfect. Hand guiding is still more accurate for satellite passes with low elevations. Overhead passes are almost impossible to track by hand since the azimuth and elevation slew rates are too high. Here computer guidance is almost mandatory.

The next step in the automation process would be to call in from a remote computer at work and after the morning passes had been captured, change the frequency to the afternoon satellite. Since I have one dedicated modem line, I could control one computer, either the computer acquiring the images or the computer that is guiding the rotators. One could, of course have a second phone line and modem, but that seems a bit extravagant.

Finally, what does one do with all these images? Since a 1 channel image requires 11Mb of storage space and 5 channels require 5 times as much space, it is obvious that one cannot store them all. I usually capture channel 2, visible and channel 4, IR bands. I then save portions of some images with the Timestep programme. I download these to the removable hard disc cartridge and to computer tape. There is an effort in the U.S. to master a CD ROM disc with many of these images by different observers. CD mastering costs have dropped drastically and the first can be produced for \$500 and subsequent discs for as little as \$1. These could then be distributed worldwide at nominal cost. One CD ROM can hold 650 Mb of data.

A 2400/1020Hz CONVERTER

Alberico Bruni, I2AX

Old facsimile machine motors were driven by a tuning fork which produced a frequency of 1020Hz.¹ Weather satellites transmit a 2400 Hz subcarrier.

Therefore, if you want to use your vintage fax machine to print pictures from the polar orbit spacecraft and avoid the curved image due to Doppler shift, you have to downconvert 2400 Hz to 1020 Hz. The circuit of Fig.1 does the job.

The squarer (IC1) gets the circuit free from the waveform of the input voltage which should be alternate and as symmetrical as possible, with a value $\geq 5.6\text{v p-p}$.

If the input frequency is 2400 Hz, divider IC2 divides by 40 providing a 60 Hz unsymmetrical square wave.

Actually it accepts all the multiples of 60 up to 2400 Hz and divides by the multiplication factor; this means that the output is always 60 Hz. The input frequency should not differ from the value of the multiple of 60 by more than 5 per thousand.

The duty cycle corrector (IC3) makes the 60 Hz waveform symmetrical, optimizing its odd order harmonic content. Multiplier IC4 actually selects and amplifies the 17th harmonic (1020 Hz) which is then cleaned and squared by IC5.

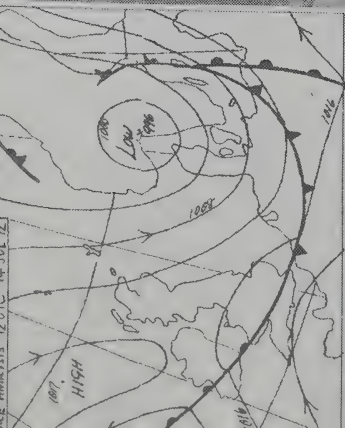
The last stage (IC6) eliminates the harmonic content of the square wave, making it sinusoidal with a distortion of less than 1% and an amplitude of about 3.5 V RMS.

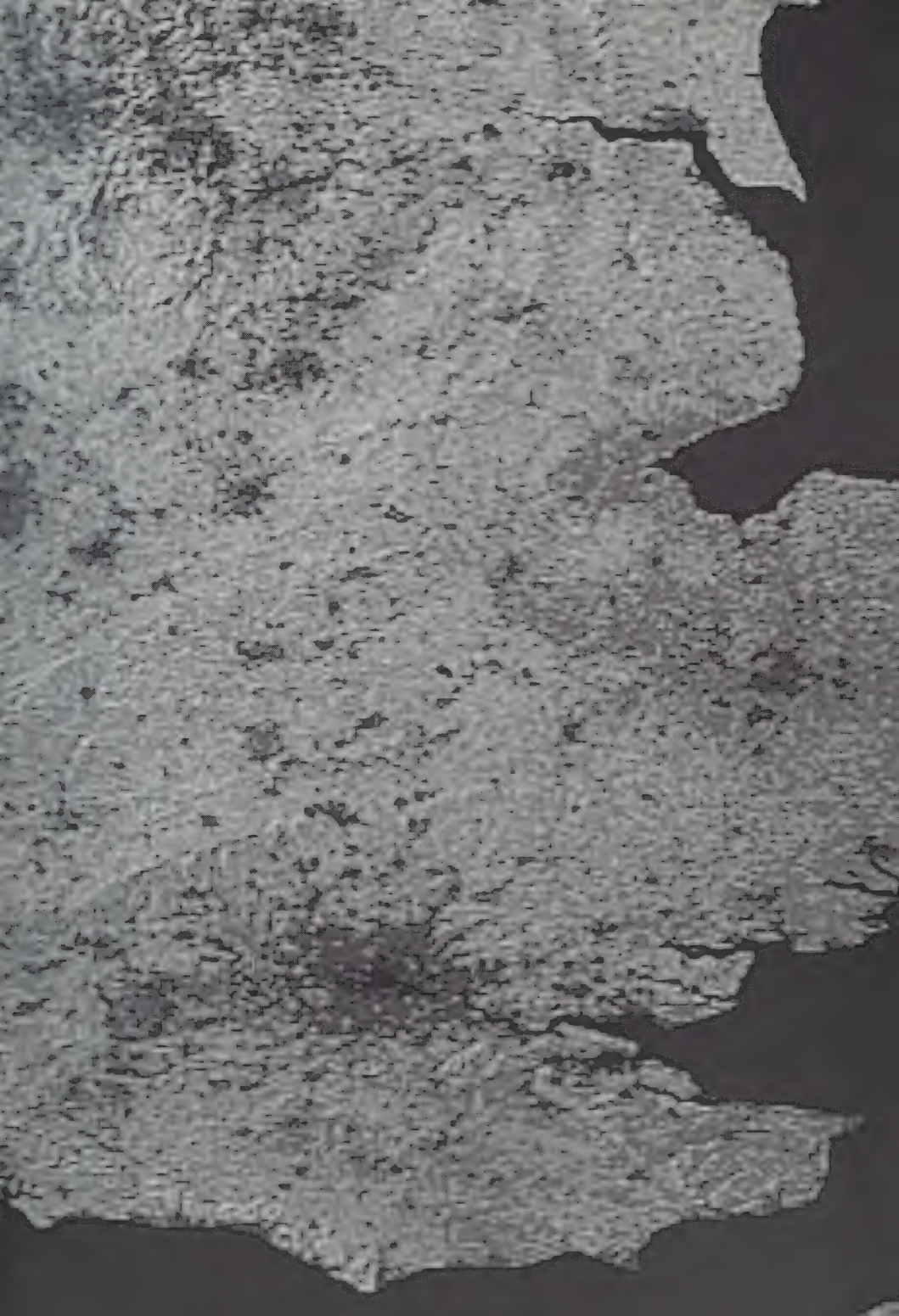
IC2 and IC3 are CMOS 555 in order to get curves with steep sides and therefore with a harmonic content sufficient to drive the multiplier.

¹ G. Emiliani, C. Pagnani, M. Righini: 'Storing Weather Pictures on Disk', RIG Newsletter No.24, Pages 27 & 37.



NOAA 11 IR
14 JUL 92 1400UTC







NOAA 9

PERIOD 101.94 MINS

FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL

-

52.5 DEG NORTH

0 DEG EAST

1992			1992			1992		
01/10	07.15	18.48	01/11	07.36	19.09	01/12	07.44	19.16
02/10	08.44	18.35	02/11	07.23	18.56	02/12	07.31	19.03
03/10	08.32	18.22	03/11	08.52	18.43	03/12	09.00	18.51
04/10	08.19	18.09	04/11	08.39	18.30	04/12	08.47	18.38
05/10	08.06	17.57	05/11	08.26	18.17	05/12	08.34	18.25
06/10	07.53	17.44	06/11	08.14	18.04	06/12	08.21	18.12
07/10	07.40	19.13	07/11	08.01	17.51	07/12	08.08	17.59
08/10	07.27	19.00	08/11	07.48	19.20	08/12	07.55	19.28
09/10	08.56	18.47	09/11	07.35	19.08	09/12	07.42	19.15
10/10	08.43	18.34	10/11	07.22	18.55	10/12	07.29	19.02
11/10	08.30	18.21	11/11	08.51	18.42	11/12	08.58	18.49
12/10	08.17	18.08	12/11	08.38	18.29	12/12	08.45	18.36
13/10	08.04	17.55	13/11	08.25	18.16	13/12	08.33	18.23
14/10	07.52	19.24	14/11	08.12	18.03	14/12	08.20	18.10
15/10	07.39	19.11	15/11	07.59	17.50	15/12	08.07	17.58
16/10	07.26	18.59	16/11	07.46	19.19	16/12	07.54	19.27
17/10	08.55	18.46	17/11	07.33	19.06	17/12	07.41	19.14
18/10	08.42	18.33	18/11	09.02	18.53	18/12	07.28	19.01
19/10	08.29	18.20	19/11	08.50	18.40	19/12	08.57	18.48
20/10	08.16	18.07	20/11	08.37	18.27	20/12	08.44	18.35
21/10	08.03	17.54	21/11	08.24	18.15	21/12	08.31	18.22
22/10	07.50	19.23	22/11	08.11	18.02	22/12	08.18	18.09
23/10	07.37	19.10	23/11	07.58	19.31	23/12	08.05	17.56
24/10	07.25	18.57	24/11	07.45	19.18	24/12	07.52	19.25
25/10	08.54	18.44	25/11	07.32	19.05	25/12	07.39	19.12
26/10	08.41	18.31	26/11	09.01	18.52	26/12	09.09	18.59
27/10	08.28	18.19	27/11	08.48	18.39	27/12	08.56	18.46
28/10	08.15	18.06	28/11	08.35	18.26	28/12	08.43	18.33
29/10	08.02	17.53	29/11	08.22	18.13	29/12	08.30	18.21
30/10	07.49	19.22	30/11	08.09	18.00	30/12	08.17	18.08
-----			31/11	07.57	19.29	31/12	08.04	17.55

MORNING PASSES ARE SOUTHBOUND

EVENING PASSES ARE NORTHBOUND

NOAA 10

PERIOD 101.13 MINS

FREQUENCY 137.50MHz

TIME OF ACQUISITION OF SIGNAL

-

52.5 DEG NORTH

0 DEG EAST

1992

01/10 07.15 17.01
 02/10 06.50 18.18
 03/10 06.26 17.53
 04/10 07.43 17.29
 05/10 07.19 17.05
 06/10 06.55 18.22
 07/10 06.31 17.58
 08/10 07.48 17.34
 09/10 07.23 17.10
 10/10 06.59 18.26
 11/10 06.35 18.02
 12/10 07.52 17.38
 13/10 07.28 17.14
 14/10 07.04 18.31
 15/10 06.39 18.07
 16/10 07.56 17.43
 17/10 07.32 17.18
 18/10 07.08 16.54
 19/10 06.44 18.11
 20/10 06.20 17.47
 21/10 07.37 17.23
 22/10 07.12 16.59
 23/10 06.48 18.15
 24/10 06.24 17.51
 25/10 07.41 17.27
 26/10 07.17 17.03
 27/10 06.53 18.20
 28/10 06.28 17.56
 29/10 07.45 17.31
 30/10 07.21 17.07

1992

01/11 06.57 18.24
 02/11 06.53 18.00
 03/11 07.50 17.36
 04/11 07.26 17.12
 05/11 07.01 18.29
 06/11 06.37 18.04
 07/11 07.54 17.40
 08/11 07.30 17.16
 09/11 07.06 16.52
 10/11 06.41 18.09
 11/11 07.58 17.45
 12/11 07.34 17.20
 13/11 07.10 16.56
 14/11 06.46 18.13
 15/11 06.22 17.49
 16/11 07.39 17.25
 17/11 07.14 17.01
 18/11 06.50 18.17
 19/11 06.26 17.53
 20/11 07.43 17.29
 21/11 07.19 17.05
 22/11 06.55 18.22
 23/11 06.30 17.58
 24/11 07.47 17.33
 25/11 07.23 17.09
 26/11 06.59 18.26
 27/11 06.35 18.02
 28/11 07.52 17.38
 29/11 07.27 17.14
 30/11 07.03 18.30
 31/11 06.39 18.06

1992

01/12 07.56 17.18
 02/12 07.32 17.18
 03/12 07.07 16.54
 04/12 06.43 18.11
 05/12 06.19 17.46
 06/12 07.36 17.22
 07/12 07.12 16.58
 08/12 06.48 18.15
 09/12 06.23 17.51
 10/12 07.40 17.26
 11/12 07.16 17.02
 12/12 06.52 18.19
 13/12 06.28 17.55
 14/12 07.45 17.31
 15/12 07.20 17.07
 16/12 06.56 18.23
 17/12 06.32 17.59
 18/12 07.49 17.35
 19/12 07.25 17.11
 20/12 07.00 18.28
 21/12 06.36 18.04
 22/12 07.53 17.39
 23/12 07.29 17.15
 24/12 07.05 16.51
 25/12 06.41 18.08
 26/12 06.16 17.44
 27/12 07.33 17.19
 28/12 07.09 16.55
 29/12 06.45 18.12
 30/12 06.21 17.48
 31/12 07.38 17.24

MORNING PASSES ARE SOUTHBOUND

EVENING PASSES ARE NORTHBOUND

ANNEX 1

(Using 1691 MHz only)

HH	00		03		06		09		12		15		18		21		HH
MM	LAN	ESOC	LAN	ESOC	LAN	ESOC	LAN	ESOC	LAN	ESOC	LAN	ESOC	LAN	ESOC	LAN	ESOC	MM
2		TIW 48		TIW 06		TIW 12		TIW 18		TIW 24		TIW 30		TIW 36		TIW 42	2
6		TIW 48		TIW 06		TIW 12		TIW 18		TIW 24		TIW 30		TIW 36		TIW 42	6
10		TIW 48		TIW 06		TIW 12		TIW 18		TIW 24		TIW 30		TIW 36		TIW 42	10
14	L1D 47		L1D 05		L1D 11		L1D 17		L1D 23		L1D 29		L1D 35		L1D 41		14
18	L2D 47		L2D 05		L2D 11		L2D 17		L2D 23		L2D 29		L2D 35		L2D 41		18
22	L3D 47		L3D 05		L3D 11		L3D 17		L3D 23		L3D 29		L3D 35		L3D 41		22
26	L4D 47		L4D 05		L4D 11		L4D 17		L4D 23		L4D 29		L4D 35		L4D 41		26
30		TIW 01		TIW 07		TIW 13		TIW 19		TIW 25		TIW 31		TIW 37		TIW 43	30
34		TIW 01		TIW 07		TIW 13		TIW 19		TIW 25		TIW 31		TIW 37		TIW 43	34
38		TIW 01		TIW 07		TIW 13		TIW 19		TIW 25		TIW 31		TIW 37		TIW 43	38
42	L1E 47		L1E 05		L1E 11		L1E 17			TIW 25		TIW 31		TIW 37		TIW 43	42
46	L3E 47		L3E 05		L3E 11		L3E 17			TIW 25		TIW 31		TIW 37		TIW 43	46
50	L5E 47		L5E 05		L5E 11		L5E 17		L1C 23		L1C 29		L1C 35		L1C 41		50
54	L5D 47		L5D 05		L5D 11		L5D 17		L5D 23		L5D 29		L5D 35		L5D 41		54
58	L6D 47		L6D 05		L6D 11		L6D 17		L6D 23		L6D 29		L6D 35		L6D 41		58

[illegible]

Dissemination Schedule S9208M02 - METEOSAT 4

(Channel A1 = 1691 MHz - Channel A2 = 1694.5 MHz)

HH	00		03		06		09		12		15		18		21		HH
	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	MM
2	D1 48	AI 48	D1 6	AI 6	C02 12	AI VH 12	C02 18	AI VH 18	C02 24	AI VH 24	C02 30	AI VH 30	D1 36	AI VH 36	D1 42	AI VH 42	2
6	D3 48	AI 48	D3 6	AI 6	C03 12	AI VH 12	C03 18	AI VH 18	C03 24	AI VH 24	C03 30	AI VH 30	D3 36	AI VH 36	D3 42	AI VH 42	6
10	D4 48		D4 6		D1 12	AI VH 12	D1 18	AI VH 18	D1 24	AI VH 24	D1 30	AI VH 30	D4 36	AI VH 36	D4 42	AI VH 42	10
14	D5 48	DTOT 48	D5 6	DTOT 6	D3 12	DTOT 12	D3 18	DTOT 18	D3 24	DTOT 24	D3 30	DTOT 30	D5 36	DTOT 36	D5 42	DTOT 42	14
18	D6 48	ETOT 48	D6 6	ETOT 6	D4 12	ETOT 12	D4 18	CTOT 18	D4 24	CTOT 24	D4 30	CTOT 30	D6 36	ETOT 36	D6 42	ETOT 42	18
22	D7 48		D7 6		D5 12	WEFA	D5 18	ATEST 1	D5 24		D5 30		D7 36		D7 42	ATEST 1	22
26	D8 48		D8 6		D6 12	WEFA	D6 18	ATEST 1	D6 24		D6 30		D8 36		D8 42	ATEST 1	26
30	D2 1	BIW 1	D2 7	BIW 7	D2 13	BIW 13	D2 19	BIW 19	D2 25	BIW 25	D2 31	BIW 31	D2 37	BIW 37	D2 43	BIW 43	30
34	D9 1	AI 1	D9 7	AI 7	C02 13	AI VH 13	C02 19	AI VH 19	C02 25	AI VH 25	C02 31	AI VH 31	D9 36	AI 37	D9 43	AI 43	34
38	D1 1	AI 1	D1 7	AI 7	C03 13	AI VH 13	C03 19	AI VH 19	C03 25	AI VH 25	C03 31	AI VH 31	D1 37	AI 37	D1 43	AI 43	38
42	D3 1	AW 1	D3 7	AW 7	C3D 13	AI VH 13	C8D 19	AI VH 19	C3D 25	AI VH 25	C8D 31	AI VH 31	D3 37	AW 37	D3 43	AW 43	42
46		AW 1		AW 7	C2D 13	AW 13	C9D 19	AW 19	C2D 25	AW 25	C9D 31	AW 31		AW 37		AW 43	46
50					D3 13	AW 13	C2D 19	AW 19	C1D 25	AW 25	D3 31	AW 31		WEFA		WEFA	50
54					D1 13		D1 19		D1 25		D1 31			WEFA		WEFA	54
58	D2 2	BIW 2	D2 8	BIW 8	D2 14	BIW 14	D2 20	BIW 20	D2 26	BIW 26	D2 32	BIW 32	D2 38	BIW 38	D2 44	BIW 44	58

HH	01		04		07		10		13		16		19		22		HH
	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	MM
2	D1 2	AI 2	D1 8	AI 8	C02 14	AI VH 14	C02 20	AI VH 20	C02 26	AI VH 26	C02 32	AI VH 32	D1 38	AI VH 38	D1 44	AI 44	2
6	D3 3	AI 2	D3 8	AI 8	C03 14	AI VH 14	C03 20	AI VH 20	C03 26	AI VH 26	C03 32	AI VH 32	D3 38	AI VH 38	D3 44	AI 44	6
10			E1 8		D7 14	AI VH 14	D7 20	AI VH 20	D7 26	AI VH 26	D7 32	AI VH 32	E1 38	AI VH 38			10
14		LXI 1	E2 8	LXI 7	D8 14	LXI 13	D8 20	LXI 19	D8 26	LZ 25	D8 32	LZ 31	E2 38	LZ 37		LXI 43	14
18		LY 1	E3 8	LY 7	D9 14	LY 13	D9 20	LY 19	D9 26	LY 25	D9 32	LY 31	E3 38	LY 37		LY 43	18
22		LR 1	E4 8	LR 7	D3 14	LR 13	D3 20	LR 19	D3 26	LR 25	D3 32	LR 31	E4 38	LR 37		LR 43	22
26			E5 8			AVHRR		AVHRR		LXI 25/26		LXI 31/32	E5 38	LXI 37/38		AVHRR	26
30	D2 3	BIW 3	D2 9	BIW 9	D2 15	RIV 15	D2 21	RIV 21	D2 27	RIV 27	D2 33	RIV 33	D2 39	RIV 39	D2 45	RIV 45	30

38	D3	3	AI	3	D3	9	AI	9	C03 15	AI/VH 15	C03 21	AI/VH 21	C03 27	AI/VH 27	C03 33	AI/VH 33	D3 39	AI/VH 39	D3 45	AI	45	38
42					E6	9			D1 15	AI/VH 15	D1 21	AI/VH 21	D1 27	AI/VH 27	D1 33	AI/VH 33	E6 39	AI/VH 39				42
46					E7	9			D3 15		D3 21		D3 27		D3 33		E7 39					46
50			WEFA		E8	9					C1D 21		C1D 27		C1D 33		E8 39					50
54			WEFA		E9	9			C2D 15		C2D 21		C2D 27		C2D 33		E9 39					54
58	D2	4	BIW	4	D2	10	BIW	10	D2 16	BIWV 16	D2 22	BIWV 22	D2 28	BIWV 28	D2 34	BIWV 34	D2 40	BIW	40	D2 46	BIW	46

HH	O2		O5		O8		11		14		17		20		23		HH
MM	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	MM
2	D1 4	AI 4	D1 10	AI 10	C02 16	AI/VH 16	C02 22	AI/VH 22	C02 28	AI/VH 28	C02 34	AI/VH 34	D1 40	AI 40	D1 46	AI 46	2
6	D3 4	AI 4	D3 10	AI 10	C03 16	AI/VH 16	C03 22	AI/VH 22	C03 28	AI/VH 28	C03 34	AI/VH 34	D3 40	AI 40	D3 46	AI 46	6
10		AW 4		AW 10	C3D 16	AI/VH 16	C3D 22	AI/VH 22	C3D 28	AI/VH 28	C1D 34	AI/VH 34		AW 40		AW 46	10
14		AW 4		AW 10			C4D 22		C4D 28		C4D 34			AW 40		AW 46	14
18	TEST	ADMIN	ADMIN	TEST	TEST	ADMIN	ADMIN	TEST	TEST	ADMIN	ADMIN	TEST	TEST	ADMIN	ADMIN	TEST	18
22																	22
26																	26
30	D2 5	BIW 5	D2 11	BIW 11	D2 17	BIW 17	D2 23	BIW 23	D2 29	BIW 29	D2 35	BIW 35	D2 41	BIW 41	D2 47	BIW 47	30
34	D1 5	AI 5	D1 11	AI 11	C02 17	AI/VH 17	C02 23	AV 23	C02 29	AI/VH 29	D1 35	AI/VH 35	D1 41	AI/VH 41	D1 47	AI 47	34
38	D3 5	AI 5	D3 11	AI 11	C03 17	AI/VH 17	C03 23	AV 23	C03 29	AI/VH 29	D3 35	AI/VH 35	D3 41	AI/VH 41	D3 47	AI 47	38
42			E1 11		C6D 17	AI/VH 17	E1 23	AV 23	C5D 29	AI/VH 29	E1 35	AI/VH 35		AI/VH 41	E1 47		42
46			E2 11		C6D 17	WEFA	E2 23	AV 23	C6D 29	WEFA	E2 35			WEFA	E2 47		46
50			E3 11		C7D 17	WEFA	E3 23	AV 23	C7D 29	WEFA	E3 35			WEFA	E3 47		50
54	CTH 4						AV 23		CTH 28				CTH 40				54
58	D2 6	BIW 6	D2 12	BIW 12	D2 18	BIWV 18	D2 24	BIWV 24	D2 30	BIWV 30	D2 36	BIWV 36	D2 42	BIW 42	D2 48	BIW 48	58

AI HRI Full Disk IR

AI/VH HRI Full Disk IR & Half Res VIS

AW HRI Full Disk WW

AV HRI Full Disk Full Res VIS

Lxx METEOSAT-ADC relay transmission (uplinked by CMS Lennion)

LXI HRI format (odd slots contain IR data, even slots contain VIS data)

LZ, LR, LY WEFA formats

COx WEFA VIS Full Res

CxD WEFA VIS Half Res

Dx WEFA IR

Ex WEFA WW

CTH WEFA processed Cloud Top Height

xTOT WEFA Full Disk

AVHRR WEFA processed AVHRR

ADMIN WEFA Administration Message

NOAA 11

PERIOD 101.99 MINS

FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL

-

52.5 DEG NORTH

0 DEG EAST

1992

01/10 03.09 14.42
 02/10 04.39 14.30
 03/10 04.27 14.18
 04/10 04.14 14.05
 05/10 04.02 13.53
 06/10 03.50 13.41
 07/10 03.38 13.29
 08/10 03.26 14.59
 09/10 03.13 14.46
 10/10 03.01 14.34
 11/10 04.31 14.22
 12/10 04.19 14.10
 13/10 04.07 13.58
 14/10 03.54 13.45
 15/10 03.42 13.33
 16/10 03.30 15.03
 17/10 03.18 14.51
 18/10 03.05 14.39
 19/10 04.35 14.26
 20/10 04.23 14.14
 21/10 04.11 14.02
 22/10 03.59 13.50
 23/10 03.46 13.38
 24/10 03.34 15.07
 25/10 03.22 14.55
 26/10 03.10 14.43
 27/10 04.40 14.31
 28/10 04.27 14.19
 29/10 04.15 14.06
 30/10 04.03 13.54

1992

01/11 03.51 13.42
 02/11 03.39 13.30
 03/11 03.26 14.59
 04/11 03.14 14.47
 05/11 04.44 14.35
 06/11 04.32 14.23
 07/11 04.20 14.11
 08/11 04.07 13.58
 09/11 03.55 13.46
 10/11 03.43 13.34
 11/11 03.31 15.04
 12/11 03.18 14.52
 13/11 03.06 14.39
 14/11 04.36 14.27
 15/11 04.24 14.15
 16/11 04.12 14.03
 17/11 03.59 13.51
 18/11 03.47 13.38
 19/11 03.35 15.08
 20/11 03.23 14.56
 21/11 03.11 14.44
 22/11 04.40 14.31
 23/11 04.28 14.19
 24/11 04.16 14.07
 25/11 04.04 13.55
 26/11 03.51 13.43
 27/11 03.39 15.12
 28/11 03.27 15.00
 29/11 03.15 14.48
 30/11 04.45 14.36
 31/11 04.32 14.23

1992

01/12 04.20 14.11
 02/12 04.08 13.59
 03/12 03.56 13.47
 04/12 03.44 13.35
 05/12 03.31 15.04
 06/12 03.19 14.52
 07/12 03.07 14.40
 08/12 04.37 14.28
 09/12 04.24 14.16
 10/12 04.12 14.03
 11/12 04.00 13.51
 12/12 03.48 13.39
 13/12 03.36 15.09
 14/12 03.23 14.56
 15/12 03.11 14.44
 16/12 04.41 14.32
 17/12 04.29 14.20
 18/12 04.16 14.08
 19/12 04.04 13.55
 20/12 03.52 13.43
 21/12 03.40 15.13
 22/12 03.27 15.01
 23/12 03.15 14.48
 24/12 04.45 14.36
 25/12 04.33 14.24
 26/12 04.21 14.12
 27/12 04.08 13.59
 28/12 03.56 13.47
 29/12 03.44 15.17
 30/12 03.32 15.05
 31/12 03.19 14.53

MORNING PASSES ARE SOUTHBOUND

EVENING PASSES ARE NORTHBOUND

NOAA 12

PERIOD 101.32 MINS

FREQUENCY 137.50MHz

TIME OF ACQUISITION OF SIGNAL

-

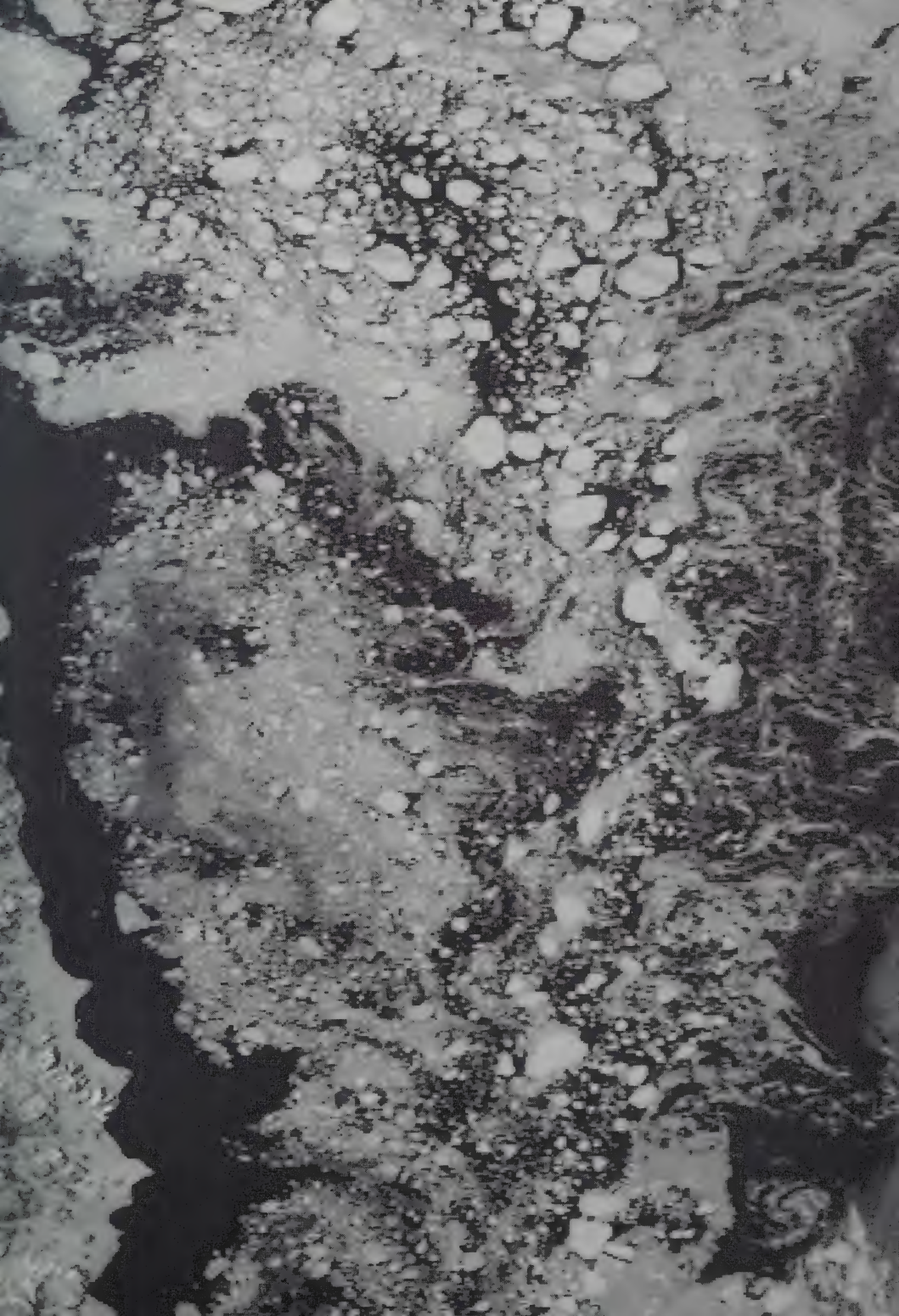
52.5 DEG NORTH

0 DEG EAST

1992			1992			1992		
01/10	08.34	18.22	01/11	07.56	17.43	01/12	08.37	18.24
02/10	08.13	18.00	02/11	07.34	19.03	02/12	08.15	18.02
03/10	07.51	19.20	03/11	07.12	18.41	03/12	07.53	19.22
04/10	07.30	18.58	04/11	08.32	18.19	04/12	07.32	19.00
05/10	08.49	18.37	05/11	08.11	17.58	05/12	07.10	18.39
06/10	08.28	18.15	06/11	07.49	19.18	06/12	08.30	18.17
07/10	08.06	17.54	07/11	07.28	18.56	07/12	08.09	17.56
08/10	07.45	19.13	08/11	08.47	18.35	08/12	07.47	19.16
09/10	07.23	18.52	09/11	08.26	18.13	09/12	07.25	18.54
10/10	08.43	18.30	10/11	08.04	17.51	10/12	08.45	18.32
11/10	08.21	18.09	11/11	07.43	19.11	11/12	08.24	18.11
12/10	08.00	17.47	12/11	07.21	18.50	12/12	08.02	17.49
13/10	07.38	19.07	13/11	08.41	18.28	13/12	07.41	19.09
14/10	07.17	18.45	14/11	08.19	18.07	14/12	07.19	18.48
15/10	08.37	18.24	15/11	07.58	17.45	15/12	08.39	18.26
16/10	08.15	18.02	16/11	07.36	19.05	16/12	08.17	18.04
17/10	07.53	19.22	17/11	07.15	18.43	17/12	07.56	17.43
18/10	07.32	19.00	18/11	08.43	18.22	18/12	07.34	19.03
19/10	07.10	18.39	19/11	08.13	18.00	19/12	07.13	18.41
20/10	08.30	18.17	20/11	07.51	19.20	20/12	08.32	18.20
21/10	08.09	17.56	21/11	07.30	18.58	21/12	08.11	17.58
22/10	07.47	19.16	22/11	08.50	18.37	22/12	07.49	19.18
23/10	07.25	18.54	23/11	08.28	18.15	23/12	07.28	18.56
24/10	08.45	18.32	24/11	08.06	17.54	24/12	08.47	18.35
25/10	08.24	18.11	25/11	07.45	19.13	25/12	08.26	18.13
26/10	08.02	17.49	26/11	07.23	18.52	26/12	08.04	17.52
27/10	07.41	19.09	27/11	08.43	18.30	27/12	07.43	19.11
28/10	07.19	18.48	28/11	08.22	18.09	28/12	07.21	18.50
29/10	08.39	18.26	29/11	08.00	17.47	29/12	08.41	18.28
30/10	08.17	18.04	30/11	07.38	19.07	30/12	08.19	18.07
-----			31/11	07.17	18.45	31/12	07.58	17.45

MORNING PASSES ARE SOUTHBOUND

EVENING PASSES ARE NORTHBOUND

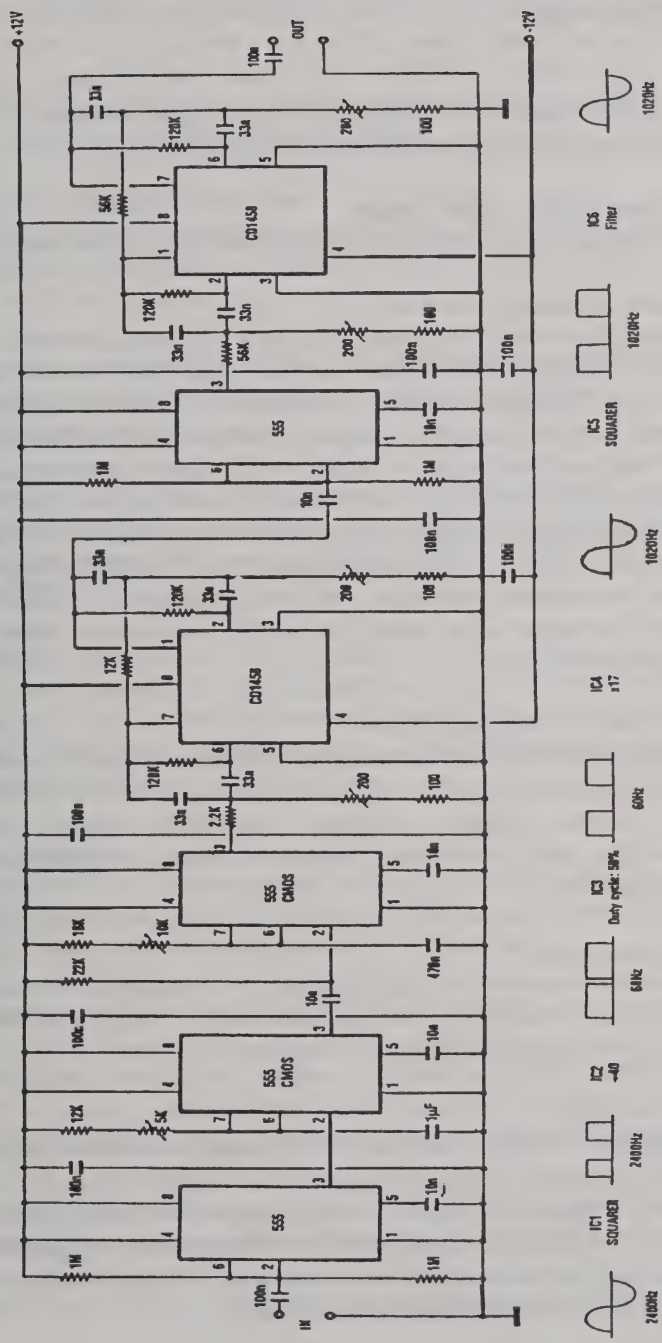






NOAA II VIS
14 JUL 92 1400UTC





MINUTES OF THE RIG AGM HELD ON MARCH 14th, 1992 AT SANDOWN PARK

The meeting commenced at 1620 with 29 members present.
Apology for absence was received from Les Currington.

Minutes of the 1990 & 1991 AGM

These were agreed by the meeting and signed by the Chairman.

Chairman and Secretary's report

Henry reported that after the upset and changes to the committee following the 1991 AGM things seem to have settled down well and we have had a very good year. Since he was both Chairman and Secretary at the moment he was rather busy but would continue to farm out *[No more puns please! - Ed.]* those matters that could be dealt with by other committee members. Henry thanked Des Watson for all the hard work he had put in over the years as Membership secretary and thanked Ray Godden for taking over. Thanks were also due to James Brown and Mike Goodall for their efforts in knocking the Newsletter into shape and bringing it into the 1990's. Thanks also to Mark Clarke for an excellent job with our accounts, now fully up to date and comprehensive.

Newsletter Editor & Make-up Editor

James thanked Mike Goodall for keeping to the deadlines, the only way to publish on time. Mike said that he could not wish for a better editor than James and wished to point out that if members wanted their articles published in 'the next newsletter', could we please have them before the deadline and not on it!

Membership secretary

Ray said he had reservations about taking on the job but thanks to Des Watson's help the changeover had gone smoothly. Ray talked briefly about membership levels and the results of the survey to date.

Treasurer's Report

Mark handed out the 1991 Statement of Accounts and went through them. Mark said we had had a very good year, so much so that we were now liable for VAT. He said RIG was in a very healthy financial position. Henry explained VAT on subs., and said he didn't foresee much of a price increase on goods during the coming year and explained RIG mark-up rates, and the fact that profit on individual items was small.

General Enquiry Secretary

John said that there were several enquiries a week by letter or telephone from RIG members to do with 'what do I need?' and 'Can anybody help?' John is to assist Ray with the members survey. He was also Schools/Education Coordinator and hoped that RIG could do more in this field and indeed hear more from the schools.

Nominees for the 1992 Committee

Colin Hall and Gordon Fleming were standing down and it was assumed, since the committee had not heard to the contrary that so were Mike Coombs and Peter Newman.

Mike Meadows proposed that the current committee, less the four above members, be re-elected. This proposal was seconded by Des Watson with all members present in favour.

Henry then proposed that James Brown and Mike Goodall, who had both been co-opted onto the committee during 1991, be made full committee members. This proposal was seconded by Mark Clarke with all members present in favour.

Les Currington had notified the committee that he wished to nominate and propose Peter Wakelin to the committee. John Tellick had notified the committee that he wished to nominate and propose Chris Kaley to the committee. Both these proposals were seconded by Henry Neale, and all present were in favour.

Any other business

A member from the floor proposed setting up local meetings of members and said he would be prepared to do so in his area. Some discussion took place and it was generally thought to be a good idea.

Henry talked about the possibility of a 'RIG Weekend', perhaps once a year.

James wondered about the locations of members when deciding where to hold such an event. Des Watson just happened to have his 1991 survey map with him and was able to show the distribution of members locations.

Henry felt RIG should have a working HRPT/PDUS system to demonstrate to members. This matter is being discussed in committee.

A member from the floor wondered about changing the Newsletter format.

Henry talked about increased postage. Mike Goodall mentioned increased printing costs, and Mark Clarke mentioned the little problem of a stock of A5 binders!

James Brown talked about the 'early days' in which he and folk like Les Currington were involved in innovative constructional work, and felt we were sadly getting away from the experimental and home-brew aspect of our hobby in favour of the 'black box' approach. He appealed as editor for members to write in with details of their projects. Henry wondered if, as far as HRPT/PDUS was concerned, black boxes were the only way these days.

Henry also appealed for more prints as we were running out of images to print in the Newsletter.

The Chairman asked the floor for any comments on the way RIG had been run over the last year. As there were no adverse comments and a few complimentary comments it was concluded that as far as those present were concerned, all was well.

There being no other business, the meeting closed at 1710.

FOR SALE...

YU3 FRAMESTORE PCBs, 75% finished, mostly populated, just needs completing and boxing.

Best offer secures, proceeds to RIG.

*Contact Ralph Taylor,
Bwlch Glas, Penrhyndeudraeth, Gwynedd, LL48 6RU
Tel: 0766 770637*

INTERPRETING WEATHER SATELLITE IMAGERY

Peter Wakelin

In this new, regular spot in the Newsletter my aim is not to produce an in-depth treatise on meteorology but to help readers interpret their weather satellite images and get a better understanding of the physical processes constantly going on in the atmosphere.

This time I shall look at a common feature of temperate latitudes, the warm-sector depression and its associated fronts. In simple terms the polar front is the boundary between tropical and polar air. It may remain more or less stationary for a few days but often, however, it becomes distorted as a bulge of warm air extends towards the cold air. If conditions are right, the air pressure will start to fall and a depression is born. The intruding bulge of warm air is known as the warm sector.

In the vicinity of depressions the two differing air masses are forced together with warm air riding up over cold air at a warm front, and cold air, which is more dense, undercutting warm air at the cold front. Where the cold air has displaced all the warm air from the surface the front is said to be occluded.

The NOAA 11 pictures at the centre of the newsletter were received at 1400 on 14th. July this year. The mid-day surface chart from Bracknell shows a depression over Southern Sweden which had crossed Scotland the previous day. Compare the visible and infra-red pictures and relate them to the chart. Note that the visible image shows cloud as white and sea as black with very little grey, whereas the IR picture shows a good range of greys in the clouds. These grey tones give an indication of cloud top temperatures, which in turn gives a measure of the cloud top heights as temperature generally decreases with height. Note how the polar front extends from Sweden where it has occluded, to Germany where it is moving south as a cold front, across southern England where pressure is uniform and it is stationary, and on to the next depression off Ireland.

In the east, near the depression, the warm air is being forced upwards as indicated by the brightness of the IR image, and as air can hold less water at low temperatures an extensive area of prolonged rain is often associated with warm fronts. Further west in the area of higher pressure the front is shown as grey on the IR picture. Now as air rises and cools near depressions it must descend somewhere, and it is this descent which results in the formation of anticyclones, the high pressure regions. As air descends

it is compressed and warms. As it warms it can hold more water vapour so clouds tend to evaporate, hence over southern England the front is marked only by a layer of low cloud. To the south of the front there is very warm, humid air in marked contrast to the arctic air moving down the North Sea and being drawn into the circulation. This combination often results in a very active cold front, and on this occasion Gothenburg recorded 59 mm of rain from the front, close to the average total for the whole of July.

The cloud structure in the cold air is quite different. Much of the North Sea is free of cloud. The sea surface temperature is around 11 degrees but in early afternoons in July the land temperature is much higher. The warm ground heats the air which then tends to rise and may reach a level cold enough for its water vapour to condense out and form clouds.

Over northern Britain this cloud is grey on the IR image, therefore quite low, showing how the higher pressure limits the convective activity. Further east however and especially over southern Norway and Denmark the picture is very different. In addition to being heated from below the air near the centre of the low is subject to dynamic forces so the clouds rise much higher. The brighter, broken clouds in this area on the IR image are typical of violent showers and active thunderstorm areas. After a brief respite Gothenburg got another drenching.

FOR SALE...

DARTCOM Receiver (LED type) boxed with power supply
TIMESTEP PCSAT3 interface and software
All in "as new" condition £180.00

Jonathan Adams Tel: Northampton (0604) 646104 after 6pm.

FOR SALE...

Meteosat Griffin Timestep Frame Store. Mint condition. £100. Delivery at cost.

Bob Anderson 0507 490569. Lincs

SATELLITE DEMODULATOR FOR THE R7000

Stu Gurske, K9EYY

What is a SWAGURSAT? I coined this name for a unique outboard filter/demodulator that can be installed onto the IF output of a communications receiver such as the popular ICOM R7000. This board adds the correct satellite bandwidth filtering to enable anyone with a general purpose receiver to enjoy the optimal filtering at present only possible with a dedicated satellite receiver.

The ICOM R7000 is a truly excellent receiver, and I have used it for several years in many different applications. The R7000 can demodulate AM, FM (narrow and wide band), and SSB signals. It tunes continuously from 20MHz into the microwave region.

However, one thing the R7000 cannot do is demodulate Wefax signals effectively, because it only has three bandwidths, namely 6kHz, 15kHz and 150kHz. The Wefax signals require a bandwidth of approximately 40kHz. If one uses the 6 or 15kHz bandwidth the signals get clipped in the narrow passband and full resolution of the image is not reproduced. Conversely, when one uses the 150kHz filter, the signal gets lost in the very wide bandwidth and only very strong signals will be reproduced effectively.

I fought this problem for many months. I even converted a scanner type radio by removing the filter and readjusting the input. This was of questionable value because scanner radios have no front end to speak of, and they are very susceptible to cross modulation and other types of interference. They are usually enclosed in an unshielded case, and I often received interference from aircraft when trying to capture polar orbiting satellites. We then decided to build a demodulator for the R7000.

Objectives and development

I did not want to dig into the R7000 and modify it in any way, and I wanted the device to be a completely self-contained. And I wanted it to be effective and do a really good job in capturing images. Even though the R7000 sells for over \$1000, *[probably £1000 over here! Mike]* I wanted it to be affordable. I started by getting suggestions from several people more knowledgeable than I, and then using their basic ideas to develop SWAGURSAT. There were several times when I almost gave up on the project because of "technical difficulties". But I kept coming back to the workbench and eventually built a prototype which showed promise. I then had some PCBs made up only to find that although it worked fine, it still did

not operate as effectively as I wanted. So, back to the drawing board, as they say.

The SWAGURSAT uses the 10.7MHz output connector on the back of the R7000 to get it's source of signal; and therein was one of the principal problems. The signal at the output jack is measured in microvolts, and needed much amplification before it could be demodulated. All of this tended to add to the final cost of the unit. Once amplified, it had to be demodulated at the necessary bandwidth. We used special filters in order to achieve the final result. A speaker amplifier was added so that we could hear the signals it detected.

Results?

Well, when I captured my first polar orbiter picture, I was really amazed! I had never seen anything like it before. Then I captured a GOES picture with the grey scale along the top, and each and every grey scale from black to white was easily distinguished from its neighbour. The next step was to try it on other ICOM R7000 receivers. It performed equally as well.

Our next experimentation with the device will be to determine whether it will work with other receivers which have a 10.7MHz output. A lot depends upon where the signal is taken off in the receiver's circuitry. If you have a different brand of receiver or any ideas, please contact me. I will be happy to work with you. I hope it will be of value to others out there who are as interested in satellite imagery as I am.

VISA & MASTERCARD... COMING SOON!!

Following many requests from many RIG members both in the UK and abroad I am pleased to announce that I am in the process of negotiating terms with our bankers to introduce both Visa and Mastercard services to RIG members. It is hoped this facility will be especially useful to our overseas members when paying their subscriptions or buying equipment thereby saving them exorbitant bank charges.

RIG 31 will contain all the details, so watch this space!!

Mark Clarke, Treasurer.

THE GIF PICTURE LIBRARY

MIKE GODDALL



The following are available at present:

- Disk 1 UK Noaa: in colour (x5)
- Disk 2 UK Noaa: most in colour (x5)
- Disk 3 Americas: various (x9)
- Disk 4 Americas: various (x8)
- Disk 5 Americas: various (x7)
- Disk 6 Space: Spaceman, Launch, Mars, Venus, Saturn, Earth (x5)
- Disk 7 Earth: various HRPT, plus GMS4 (x8)
- Disk 8 Russian Meteor: Various (x5)
- Disk 9 Various (x9)
- Disk 10 Russian Meteor/Landsat: USA (x4)
- Disk 11 AusGMS and Noaas (x4)
- Disk 12 Mets and Noaas (x4)
- Disk 13 HRPT: Italy and Greece by Marciano Righini (x6)
- Disk 14 SW Pacific (x5)
- Disk 15 HRPT (Peter Hayes article, RIG29) (x7)
- Disk 16 APT, various (x3)
- Disk 17 FengYun and Okean (x3)
- Disk 18 HRPT: various by Marciano Righini (x9)
- Disk 19 HRPT: various by Marciano Righini (x9)
- Disk 20 HRPT: Set of 5 channel HRPT by Peter Hayes + Greenland (x6)
- Disk 21 HRPT: various by Peter Hayes and Marciano Righini (x7)
- Disk 22 HRPT: various by Tom Loebl (x5)
- Disk 23 Space: Shuttle + Mars (x3)

All pics are in PC GIF format; mostly 640x480x256 levels. Some are up to 1024x768x256 levels. (All VPIC compatible.)

SHAREWARE PROGRAMS... Viewing and tracking programs (zipped)
(PKUNZIP unzipping program included on all Shareware Disks)

- Disk 99
 - VPIC v.4.8 (viewing program, GIF, RIX, PCX, etc.)
 - IMAGE PROCESS v.1.0 (GIF editing program)
 - PCTRACK v.1.1 (Satellite tracking program, simple to use)
 - GRAPHICS WORKSHOP v.6.0 (viewing/conv. for GIF, etc.)
- Disk 99A
 - PCTRACK v.2.1 (latest version, but more complicated to use)
 - EDSAT v.1.6 (program for manipulating NASA 2-line files)
 - ELEMENT MANAGER v.1.8 (management for 2-line and Amsat)
 - IMAGE DISPLAY v7.4 (viewing and manipulating program)
 - VGA CAPTURE v.8.0 (resident screen capture program)
- Disk 99B
 - WINGIF (viewing program for GIF via Windows3 & 3.1)
 - PAINTSHOP (another viewing program - Windows3 & 3.1)
 - GEOCLOCK (Graphical map showing daylight areas, etc.)
 - LEARNORBIT (Teaching program about orbits)
 - WX (Weather forecasting program)

You will need a viewing program to see the files; VPIC is recommended for starters. It is supplied on Disk 99 in zipped form. To use zipped versions of any of the programs... make a directory or subdirectory on your hard disk where you want the program to reside (i.e. C:\VPIC) and unzip it into the directory as follows:

PKUNZIP <filename.zip> <Hard drive letter:\directory or subdirectory>

(i.e. PKUNZIP VPIC46 C:\VPIC).

Next read the Doc and Readme files to enable you to configure it to suit your video pcb and machine.

Remember that some of the images may lack contrast and brightness. As most of the files supplied are in their original form, 256 levels, you will probably have to use the contrast and brightness keys on your viewing program to set the levels to your own preference. This can make a world of difference to the finished picture. Remember that if you resave the .GIF file after altering the brightness and/or contrast you will always lose some of the original data. This is the main reason for us supplying them in their original form.

How the system works: All disks will be copied for members free of charge, providing blank formatted disks are sent to me, **with return addressed label and return postage. Maximum of 6 disks at any one time.**

Please send extra stamps to the value of £1.00 or a £1.00 coin to enable me to return overseas members' disks post free. (No small cheques please; the Bank takes half of it in charges). This small charge also helps towards the running costs, purchase of disks, etc.

Overseas Members: As above, but return post is free. I would appreciate any polar orbiter GIF files you have for the Library.

Most Library disks have approx. 1.2Mb on them; **the best format to send is 1.4Mb HD 3.5"**. All other PC formats, 1.2Mb, 720kb and 360kb, can be copied to, but you won't get much on a 360kb! ***Only legal PC formats please. None of those drilled out 720kb etc. formatted to 1.44Mb!***

UPGRADES...

PC-SAT3 Upgrade disk. July 91, as mentioned in RIG24, including MET3-4. £3.00 handling charge, state disk size required.

PROSAT-II Upgrade disk, (March 92) including F10, increased resolution on Russian Mets when saved as section, plus a new good HP type Laser/Bubble-Jet print routine, plus minor fixes. £3.00 handling charge, state disk size required.

SNOISE, Signal to noise measuring program for Meteosat (for ProsatII system only) Send disk and return S.A.E.

TIMESTEP HRPT DEMO DISK, 1.4Mb. £3.00 handling charge.

All available only from the Chairman.

THE SOVIET & CHINESE SCENE

PETER WAKELIN

METEOR 3-4 started playing up soon after I wrote my piece for the last Newsletter, saying how good it was. All was well until about 23rd. April. On 25th. David Hopkins of Bournemouth, one of the world's most prolific visual observers of satellites, noticed that it was varying considerably in brightness, whereas it is normally steady. I listened at the predicted times on the 28th., on learning of David's observations, but it was not transmitting. However, John Murray was monitoring in Brixham on the evening of 27th. and received a remarkable picture showing that the spacecraft had lost stability yet was still imaging. The problem was soon resolved and I received a good picture on April 29th.

METEOR 3-3 transmissions reappeared in early May and for most of June METEORS 3-3, 3-4, and 2-19 were all transmitting very good imagery. Now, in late July, 3-4 and 2-20 are transmitting. The latter still has sync problems and I cannot persuade PROSAT II to produce a picture, but my frame-store can! METEOR 3-5 remains silent, but is probably available for service if required.

FENG Yun 1 and 2 were launched in September 1988 and September 1990 respectively, so perhaps we shall get another one soon.

A status report indicating which polar orbiting satellites are transmitting is now available on both the RIG and Timestep electronic bulletin boards. It is updated weekly, normally on Friday evenings, when the orbital elements are also updated.

I am sure that most readers realise that the series 3 METEORS are the highest of the polar orbiting weather satellites, so for images of far away places these are the ones to use. From southern Britain it is possible to get images of the Aral Sea and Hudson's Bay.

To get a little extra distance it is worth considering the position around the orbit of the satellite's perigee. Eccentricity is usually small but not zero and the difference between perigee and apogee heights is typically 30-40 kms. This is not large compared with the height of the satellite but can make the difference between a noise-free image and a poor one.

Orbital elements include 'argument of perigee' which is a measure of the position of perigee around the orbit from the northbound equator crossing. Thus when the perigee is at the southernmost point of the orbit, the argument of perigee is 270 degrees. Apogee then occurs at the northernmost point of the orbit. For the great majority of satellites, the perigee moves slowly around the orbit (the movement is zero only when the

square of the cosine of the inclination is 0.2, i.e., when the inclination is near 63.5 degrees) and for the METEOR 3 satellites the argument of perigee decreases by 2.5 degrees a day. It is therefore a simple matter to ascertain if a satellite is well placed for long distance viewing.

With the sun now moving quickly south, polar illumination is decreasing at high northern latitudes and good visual images are not available. So why not look at the infra-red images instead? The onset of Winter actually increases the land/water temperature differences. With lengthening nights and clear skies land temperatures fall rapidly, while large bodies of water retain their heat well. Rivers and coastlines are often very prominent and urban hot-spots can be detected. The series 3 METEORS being higher than the NOAA satellites move more slowly so at 120 lines per minute the line separation is only 2980 metres compared with 3120 m for the NOAAs resulting in a slightly higher resolution.

CENTREFOLD PICTURE INFORMATION

1. NOAA9 HRPT Channel 2 on June 22nd. 1992 UTC 06:53-07:08, descending. On descending passes the NOAAs cross the Italian peninsula almost perpendicularly; this is why Italy appears to be lying down. The picture shows southern Italy, Sicily and Malta. Printing format: all the lines are printed twice; a part of the line (600 pixels out of 2048). The ash-edged cone of Mount Etna which erupted earlier this year is clearly visible. Printed and supplied by Marciano Righini, I4MY (Italy)

2. Two pictures by Peter Wakelin to accompany his article on interpreting weather satellite imagery. They are 'off the screen' shots. The satellite is NOAA 11, received at 1400 on July 14th. Both visual and infra-red pictures are shown, and a midday surface chart from Bracknell accompanies the infra-red.

3. An HRPT image in visible light showing Southern England, from a 1024x1024x256 GIF file from Bob Sansoni from York.

4. Another excellent HRPT image from Marciano Righini, showing Ungava bay on the Labrador coast of Canada, icebergs and all!

KEPLER ELEMENTS

MAX WHITE

NOAA9						
1	15427U		92207.89142025	0.00000113		1399
2	15427	99.1422	235.7302	0015223	10.6350 349.5137 14.13418100	14
NOAA10						
1	16969U		92208.70425528	0.00000206		9823
2	16969	98.5352	227.1041	0013171	180.9569 179.1580 14.24688624	10
NOAA11						
1	19531U		92207.89940449	0.00000163		8780
2	19531	99.0836	172.0889	0010978	278.4192 81.5750 14.12717726	14
NOAA12						
1	21263U		92207.93339723	0.00000000		3399
2	21263	98.6939	237.2876	0014111	79.6013 280.6697 14.22076811	10
MET2-17						
1	18820U		92203.16466735	0.00000107		7379
2	18820	82.5443	102.2180	0017122	341.6508 18.4043 13.84644052	19
MET2-18						
1	19851U		92210.85063703	0.00000046		6917
2	19851	82.5194	332.6751	0015242	2.7756 357.3486 13.84292729	17
MET2-19						
1	20670U		92211.06759778	0.00000062		4406
2	20670	82.5447	35.0184	0015086	283.2999 76.6479 13.84132891	10
MET2-20						
1	20826U		92210.83663388	0.00000050		4423
2	20826	82.5246	333.6240	0012532	172.3792 187.7562 13.83504873	11
MET3-2						
1	19336U		92206.21713143	0.00000004		9423
2	19336	82.5433	94.0414	0016228	193.2027 166.8673 13.16948989	10
MET3-3						
1	20305U		92210.99944742	0.00000043		5948
2	20305	82.5522	32.8729	0015375	199.9899 160.0623 13.16002671	18
MET3-4						
1	21232U		92210.67026359	0.00000043		2406
2	21232	82.5420	296.4912	0018893	115.1821 245.1263 13.16809629	13
MET3-5						
1	21655U		92211.05318664	0.00000043		3075
2	21655	82.5544	242.7107	0014800	114.5313 245.7368 13.16807049	18

(No excuses for listing all the Mets as we cannot tell which will be on!)

An explanation of the 2-line format for those who wish to convert or update their Amsat format files... In order, the blocks of data represent the following...

Line 1 : NORAD sat.number - Epoch date - Decay Rate - Checksum

Line 2 : NORAD sat.number - Inclination - Right Ascension - Eccentricity - Arg.of Perigee - Mean Anomaly - Mean Motion - Checksum

(Note: The Eccentricity has a leading decimal place which is not shown but assumed.)

BULLETIN BOARDS: There are now operating, 24 hours a day, two Bulletin Boards that you can use to download Keplers and get other information regarding latest developments in the Weather Sat scene. The Keplers are updated every week and are in Amsat and 2-line format. The RIG BBS is on 0945 85666. The Timestep BBS is on 0440 820002. The protocol is the normal standard, 8 bit, no parity, 1 stop bit.

SHAREWARE CORNER

MIKE GOODALL



VPIC v4.8

This replaces the version 4.6 that we have been supplying on Disk 99, and appears to have eradicated the bugs prevalent in the earlier issue. I haven't managed to crash it yet, and you don't get all those extraneous characters if you click on an empty part of the screen. This still remains the most popular entry-level software viewing program for beginners, and because of its ease to use, is recommended for viewing the GIF Library files. It works with almost all known Video cards. *Available on Disk 99.*

WINGIF v1.4

Those of you who use the WINGIF v1.0 shareware (the Windows 3.0 viewing program) who have recently upgraded to Windows 3.1 will notice that this will no longer work with GIF files and usually hangs up the machine, although some other formats seem to still work OK. Version 1.4 now overcomes this and works well. It also produces screened images on a laser printer which are suitable for direct publication at the printers. *Available on Disk 99B.*

PAINTSHOP v2.02

Another viewing program for Windows 3 and 3.1. Very similar to Wingif, but handles more picture formats. *Available on Disk 99B.*

GEOCLOCK v.4.4

A graphical map program showing the areas of the globe in sunlight, darkness and twilight. Although meant for the American market, has a map showing Europe and North Pole. Registering brings you extra maps and up to svga modes. *Available on Disk 99B.*

LEARN ORBIT

A teaching program that explains graphically all the orbital elements and their meanings. Enables you to alter the elements and create your own orbits. A little technical, but well displayed. *Available on Disk 99B.*

WX v.4.3

A weather forecasting program, containing several sections. By inputting data, such as temperature, barometric pressure, etc. makes forecasts for next 24 hours, etc. *Available on Disk 99B.*

For information on the current versions of programs on the Shareware discs see the GIF Picture Library page.

Don't forget... all the Shareware, etc. on Disks 99, 99a and 99b can be downloaded from the RIG Bulletin Board.

Remember, shareware is not free. If you use it, please register it!

MEMBERS' LETTERS



[Any letters sent to the Editor, Make-up Editor or Committee are assumed to be available for publishing in the Newsletter, unless otherwise specified.]

Dear Henry,

I think the Newsletter is excellent these days. Congratulations to all those concerned and thank you for all the hard work that is put into publishing it.

Tony Jay, Cheltenham.

Dear Henry,

After reading your article in the recent RIG magazine I had a measure of the feed horn legs on my one metre dish, only to find I had been running short, ie only 47.5cm. What an addition of another 5.5cm will make I can only wonder, complete satisfaction?

Joking apart, I have been very impressed with the results of the dish over the Timestep Yagi I was using, and found the SNOISE program very helpful when setting up the dish.

I would like to take this opportunity to thank you for your help at rallies in the past and I am looking forward to the possibility of Regional Group meetings. Not being a Radio Ham I am not in touch with other members.

Bob Wolk, Rochester.

Dear Henry,

Congratulations on the new look mag, and on the delivery schedule! A job well done by all.

Roy Clarke, G8AYD, via BBS.

Dear Mike,

Saturday morning the 30th of May. Surprise! RIG newsletter No.29 on the doormat. Great! I think it is a good idea that you invented a kind of surcharge to be able to send us foreigners(?) the library disks post free.

You could have asked for IRCs but that is daylight robbery by the various GPOs. *[IRCs are not much use, as they can only be used in exchange for surface mail - it would probably take 3 months to Australia, Mike].*

It is about time they introduced some standard EEC stamps. That would make things a lot easier.

Jan Jager, PAOTBE, The Netherlands.

Dear Editor,

A number of replies to letters in RIG29, June 1992.

For Rodney Stubbs, there is a society called The Remote Sensing Society', c/o Dept. of Geography, The University, Nottingham NG7 2RD, which is a professional body and would be able to answer the physics questions. Or the European Space Agency could help as they publish quite a large number of booklets, free or otherwise, on space research. ESA Publications Division, Estec, PO BOX 299, 2000 AG Noordwijk, The Netherlands.

As regards Brian Taylor's question, it would probably depend on the threshold (and other questions) of the CCD cell. i.e. How many photons would be needed to activate the cell. (Perhaps the data supplied by companies selling CCD's could be able to help).

For Graham Smith the computing should be rather fun, (though I am currently unemployed as a software engineer) a starting point to get an image intensifier could be through Ealing Optics (Greyaire Rd., Watford), or Melles Griat (Frederick St., Aldershot, Hants).

A useful book on optics is 'Electro-Optics Handbook', published by RCA (Sunbury on Thames) £4.00 in 1983

John C. Fairweather, Woking, Surrey

Dear Editor.

I have been a member of RIG now for 5 years and I have looked forward to the magazine dropping through the letterbox. However after reading Issue 29 I felt I must write in to comment on what I feel is a worrying trend.

It has been very noticeable with the last two issues that a large amount of coverage has been given to the Timestep systems almost to the exclusion of everything else despite the assurances given that on Dave Cawleys election to the committee the contents of RIG would not be biased. Indeed any newcomer reading the latest issue would see a mention of Timestep on virtually every page and would come to the conclusion there were no other systems on the market.

I would like to point out that the PC is not the only platform available for receiving weather satellite images. I use an Acorn Archimedes system running the excellent package from Spacotech. In fact their weather satellite software has recently been upgraded and I have been using a pre-release version and been very impressed. For example I have been downloading images while writing this letter on the same computer (one of the benefits of having a multi-tasking operating system).

You can also configure the software to collect various images and display them in different windows and animate them. So, you could for example set up collection tasks for the D2, CO2 and C2D images, have them all displayed with 256 grey levels AND ANIMATED on your screen at the same time with sequence length only limited by the capacity of the hard disc.

The software will also collect all polar orbiter formats and all images can be transported to another software package produced by Spacotech called PDSView. This will give access to various image processing facilities such as image enhancement, contrast stretching, colouring, and others too numerous to mention.

However its greatest advantage is the reproduction of multi-spectral images (combining the visible and infra-red) and if you have a graphics enhancer card fitted to the Archimedes then these can be displayed with a palette of over 65,000 colours giving realistic colour images. Also the Arc is capable of reading PC format discs directly so that primary data collected on a PC can be loaded into PDSView, processed and then displayed as superb multi-spectral images. In fact the speed and graphics capabilities of the Archimedes make it an ideal platform for image reception and processing.

Please, therefore let us see more recognition in RIG that other systems are available, that the magazine is devoted to all aspects of remote imaging and is not becoming an advertising vehicle for one particular manufacturers products.

Graham Woolf, Ringwood, Hants.

Dear Ed.

Firstly may I apologise for getting rather near the deadline with this letter, but I had been hoping to solve my problem sooner.

Anyway on with business. You may remember you published an earlier letter of mine - the general point of which was the difficulty I was having in finding a framestore at reasonable cost. Well the good news is that thanks to a members advertisement in RIG 29 I am now the proud owner of a Martelec MSG 20 graphstore. Although it gives great pictures with my BBC Master I have one or two queries. I wrote to Martelec some weeks ago but have, as yet, not received a reply, so I wonder if any RIG readers with an MSG 20 can possibly help with any of the following:

Is there a more recent version of the GRACE software than V.2?

Why does the menu show a METEOR decoding option yet when selected it just shows an error message? Do I need a hardware upgrade?

Finally, when decoding an image and the screen has just filled and the image scrolls and more new lines are displayed, they are displayed as max white and sync is lost as if the signal level is too high. I have traced it to a logic error on the A/D board, but what causes it? Has anyone else had this problem?

I would be pleased if any members could write or phone (££...) with info. Or maybe someone from Martelec might help.

*P. Matley 13 Kildare Avenue, Thornton - Cleveleys, Lancs. FY5 2RZ
Tel: 0253 826535*

THE NEALE'S GUIDE

TO SECOND HAND EQUIPMENT PRICES



This guide is intended as a reference to expected second-hand equipment prices when sold between members and at rallies, etc. It can only be approximate, due to age and varying condition of equipment.

FRAMESTORES (YU3 TYPE)

SINGLE PAGE, uncased £150.00, cased £200.00 upwards

FOUR PAGE, uncased £200.00, cased £240.00 upwards

PCSAT3 SYSTEM (Members Price, New £52.00 incl. P&P)

In good cond. £40.00 upwards

PROSAT II (Members price, New £122.00 incl. P&P)

Clean £100.00

OMNIFAX (New price £201.19 inc. P&P)

In good cond. £140.00 upwards

AMIGASAT PACKAGE (New price £165.41 incl. P&P)

In good cond. £110.00 upwards

DARTCOM (RIG) DOWNCONVERTER (New price in box £183.00)

In good cond., no corrosion £120.00 upwards

MICROWAVE MODULES DOWNCONVERTERS

Working cond. £40.00 average

DARTCOM SCANNING RX, LCD DISPLAY (New price, unboxed £169.00)

Smartly boxed £180.00 upwards

AS ABOVE, but LED CHANNEL READOUT (New price, unboxed £128.00)

Smartly boxed £140.00 upwards

CIRCUIT VHF RX (New price, around £40.00)

Boxed, working, £30.00 approx.

DISHES (New price with mounts and feed £70.00 - £75.00)

Clean cond. £30.00 upwards, depending on cond. size, feeds, mounts, etc.

This has only been an attempt at producing a guide. Perhaps you could advise James of actual deals and if you agree with our prices.

RIG AT RALLIES



Below is a list of rallies attended by RIG last year. We hope to see you again at these events this year, but if you are in doubt over any event, please give the Chairman a phone call.

September 13	BARTG - Sandown
September 20	Peterborough
October 23-24	Leicester

We are always pleased to see volunteer members at these events, especially those who live local to the event, who can help on the stands, and give the regulars a small break during the day.

A quarterly publication for hardware, software and applications of WEFAX, APT, VAS, HRPT and GOESTAP.

WeatherSat Ink

**The Environmental
Satellite Applications Journal**

4821 Jessie Drive, Apex, NC 27502, USA

*\$15 US per year \$20 all others, US funds
MasterCard/Visa OK with \$1 surcharge*



General Enquiries	John Tellick	081 390 3315
Meteosat information		
NOAA information		
Supplier Complaints		

A copy of the Group Rules can also be obtained from John Tellick

Russian, Chinese satellite information/status	Les Currington	0707 326058
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Schools Education Co-ordinator	John Tellick	081 390 3315
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Schools/	John Murray	Torquay	0803 217754
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Educational Enquiries	Frank Bell	Godalming	0483 416897
	Tom Walter	Reading	0734 871330
	Bob Coombes	Haslemere	0428 642930
	John Din	Bristol	0454 773387

Framestore Technical Support	Mike Coombs (7.30pm-9.30pm)	0530 243494
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RIG MICRO SPECIALISTS:

PC and Compatibles	Dave Cawley (after 6.30pm)	0440 820040
BBC Micro	Enquire via John Tellick	081 390 3315
Commodore Amiga	Chris Pretty	0420 82752
Atari ST, Archimedes	Peter Newman	0487 812121
PCSAT3 and PROSATII	James Brown	0656 782632
HRPT and Primary Data	Dave Cawley	0440 820040

NOTE: We are very grateful to the above members for offering their services to the Helpline. Please do not abuse the service by ringing them for queries other than those listed against their names.

RIG SHOP CORNER



*** ALL PRODUCTS FOR SALE TO RIG MEMBERS ONLY ***
All prices shown include post and packing except where marked

Receiving Equipment

	UK Price	Overseas Price
RIG DARTCOM Meteosat Downconverter. Assembled and tested module in tin plate box Complete, assembled and mounted in weather-proof box.	£147.00 £183.00	£126.00 £158.00
RIG DARTCOM VHF Scanning Receiver. Assembled and tested module, with LED channel number display.	£128.00	£110.00
As above, but with LCD frequency read-out instead of LED channel number display.	£169.00	£145.00
<i>Both the above items are modules and require a box, together with several components, switches, etc.</i>		

RIG TIMESTEP Receiver.

2 ch. 137.50-137.62MHz. Ready built and
boxed, requiring only 12Vdc, low level
audio out, 2400 tone squelch detector,
very compact, channel change by remote
grounding switch. Ideal for dedicated

Downconverter IF. A chance to release your Dartcom scanner RX!

**NOTE: THESE ARE NOW OUT OF STOCK, but see Chairman's Waffle
regarding future supplies.**

RIG TIMESTEP PROscan Receiver.

8 ch. (6 crystallised, 2 spare) Ready built and
boxed, requiring only 12Vdc and speaker.
2400 Tone squelch detector.

£164.00 £141.00
Special Rally Price £160.00

RIG VHF Preamp.

Includes a bandpass filter and is ideal for mast-
head mounting. Assembled and tested module, only
needs boxing.

£16.00 £15.00

RIG 1695MHz Low Noise Amplifier kit.

Experienced constructors only.

£28.00 £25.00

Computer Software/Hardware

RIG TIMESTEP PCsat III, IBM/PC Comp. System.

See main advertisement.

£ 52.00 £ 45.00
Special Rally Price £ 49.95

RIG TIMESTEP PROsat II, IBM/PC Comp. System.

See main advertisement.

£122.00 £105.00
Special Rally Price £120.00

Antenna systems

RIG CROSSED DIPOLES

A Turnstile type design, in kit form (*available in UK only*) incl. P&P £24.00
Special Rally Price £18.00

DISHES (*Available in UK only - Prices do not include P&P, see below*)

1.6 Metre, used condition. £48.00

90 cm active area, complete with feed horn and mount, £70.00
including dish to 2" (50mm) pole bracket.

The above prices are for collection from the Chairman, or by prior arrangement from Rallies. For delivery quotation ring Mark Clarke on 0787 74128 evenings only between 7.00 and 9.00pm, Fax 0787 475029 or write for a quotation to 9 Park Lane, Bulmer Tye, Sudbury, Suffolk, CO10 7EQ. For further details see RIG28 page 9.

RIG Binders

Available by post from Gordon Fleming, 168 Bythway, Welwyn Garden City, Herts. AL8 1DU. UK Price £4.00 each, European Price £4.50, Outside Europe Price £5.00. Cheques to "REMOTE IMAGING GROUP" please.

Back Issues of RIG Newsletters

	Rally Price	UK Price	Europe Price	Outside Europe Price
RIG 8-11 1987	£4.00	£5.00	£5.50	£6.50
RIG 12-15 1988	£4.00	£5.00	£5.50	£6.50
RIG 16-19 1989	£4.00	£5.00	£5.50	£6.50
RIG 20-23 1990	£5.00	£6.00	£6.50	£7.50
RIG 24-27 1991	£5.00	£6.00	£6.50	£7.50

Note: Prices quoted are for a set of four, including Post and Packing.

RIG 1-7 are currently out of print. Individual issues are no longer available (hardship cases excepted).

Ordering Information

All items are available from the Chairman, Henry Neale (except where marked) and include return by UK 1st class mail (except dishes and Newsletters). Euro overseas sent via Airmail printed paper rate.

UK prices include VAT where applicable, receipts issued upon request.

Remote Imaging Group VAT Registration No. 594 7483 83.

Channel Isles and Isle of Man, divide by 1.175 to remove VAT content.

UK members, By Cheque or Postal Order. Overseas members, Pay by Bank Draft (drawn on a UK London-based bank) or Eurocheque (Payments to a Maximum of £100.00 in any one Eurocheque). No local currency please.

All cheques made payable to "REMOTE IMAGING GROUP".

RIG - Timestep PCsat III

This is a low cost solution to Weather Satellite Imaging on PC type computers. Although extremely low cost it handles all known APT satellites. It supports all known VGA video cards in all modes. It will automatically animate up to 100 frames and is in use by over 1,000 people throughout the World !

Satellites

We cover all known satellites: NOAA, Meteor asynchronous, Meteor synchronous, Okean asynchronous, Okean synchronous, Feng Yun, Meteosat and GOES. Most importantly there is no Doppler bending of the edges of the image, even from tape ! We deliberately do not use crystal control for the Soviet series as this produces bad doppler bending and no signals at all from tape. Quite simply the handling of Polar satellites is superb ! It is possible to receive GOES (just) in the UK, the transmission standard is slightly different, this is why we do not compromise and have a special setting for GOES.

Animation

Animation is crucially important to satellite enthusiasts. Some systems allow you to animate AFTER the images have been received. We call our system "Stand Alone Animation"; you simply set the computer and walk away. Each image is automatically received and animated. Without touching the computer at all, every time you walk past you will see the latest sequence of frames automatically animating ! Animation is smooth, fills the whole screen and is completely flicker free. You only need 640K of memory as the storage is on your hard disc. Animation is standard, not an option.

Video Cards

We support ALL video cards in ALL modes. Depending on the card used it is sometimes necessary to view the image in different modes after reception. Although we fully support 1024 x 768 x 256 this really needs a 20" monitor to do justice. With 14" monitors the pixel size is less than the shadow mask aperture, so you end up losing data. By far the best mode is 800 x 600 x 256, this gives an non-interlaced flicker free display.

Computer requirements

You can use ANY VGA card in ANY mode, a 286 or better will give the best results. A hard drive is recommended. MS DOS is preferred and all features are available on a 640K memory machine.

Due to the World Wide success of our PROsat II system we have decided to reduce the price to beginners to just

£49.95 inc VAT plus £2.05 postage.

**Henry Neale RIG Chairman
Thornlea Fishergate Sutton St James
Spalding Lincs PE12 0EZ Tel. 0945 85353**

RIG - Timestep PROsat II

This system provides the look and feel of Windows 3, image processing, 3D, NOAA Gridding, NOAA temperature calibration and full data from NOAA and the Soviet series in a huge 2.4MB file. Reception of ANY satellite can be in ANY VGA mode !

Satellites

We cover all known satellites: NOAA, Meteor asynchronous, Meteor synchronous, Okean asynchronous, Okean synchronous, Feng Yun, Meteosat and GOES. Most importantly there is no Doppler bending of the edges of the image, even from tape ! We deliberately do not use crystal control for the Soviet series as this produces bad doppler bending and no signals at all from tape. Quite simply the handling of Polar satellites is superb ! It is possible to receive GOES (just) in the UK, the transmission is slightly different, this is why we do not compromise and have a special setting for GOES.

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NOAA Gridding and Temperature and Resolution

If you are not sure why these features are important we suggest you read the review in RIG 26 by Rev James Brown. Quite simply you can point to a spot on the image and read its temperature directly, no ground truth data required ! The Gridding will overlay the image with latitude and longitude lines. The mouse is interactive and will give spot lat and long. Combined with temperature, it is possible to simultaneously read latitude, longitude and temperature. This incredible program will store ALL of the data received during a polar pass, both visible AND infrared in FULL resolution. Any area of either sensor can be analyzed in full resolution; you do not have to decide before the image what you want to see.

Features

A built in dithered Laser Dump gives results of outstanding quality, all 32 grey scales are clearly visible from the Meteosat Test Card and the tiny writing is readable ! Histogram equalisation is incorporated to quickly contrast stretch dark or light images. Transects between any two points can be drawn. A median filter removes outlines from Meteosat for 3D projection and remarkably removes spot noise from noisy satellites.

£120.00

inc VAT plus £2.00 postage.

A demonstration disc & colour brochure are available.

**Henry Neale RIG Chairman
Thornlea Fishergate Sutton St James
Spalding Lincs PE12 0EZ Tel. 0945 85353**

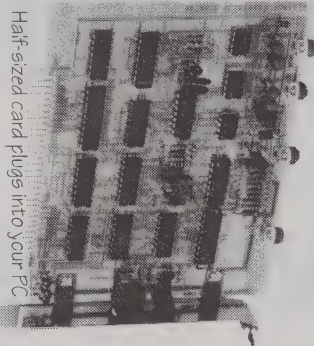
Featured in
April and May
1990 issues of
QST magazine!

High Tech Satellite Imagery!

Achieve professional results—often surpassing the capabilities of local TV weather reporting. Plug it into your receiver earphone jack and decode all APT modes—GOES & Polar satellites as well as HF Marine fax. Capture, enhance, print gray scale weather facsimile using your PC. Latest technology for optimal noise rejection, self-test modes, advanced menu-driven software and help windows assure easy operation.

LOOK AT THESE FEATURES!

- All modes: GOES-WEFAX, GOES-TAP, NOAA, Meteor, Meteosat, HF-WEFAX, HF-Marine/C-Band wire photos
- Full satellite pass at full resolution
- Display 1280X1024 with 256 colors and below
- Temperature calibration & contour maps
- Latitude/longitude grids and "you are here" function
- Integrated GOES-TAP and WEFAX animation
- Unattended operation & 24-hour scheduled timer
- Standard TIFF and GIF file formats
- User-defined palettes, interpolation, zoom, scroll, rotate, reverse, histograms, brightness, contrast, negative, linear/logarithmic enhancement curves.
- Print gray-scale on laser and dot matrix printers
- Laboratory tested and FCC class B certified



Half-sized card plugs into your PC

Name _____
Address _____
Phone _____

Complete kit/software _____
Assembled card/software _____
Shipping (Foreign orders-add \$14) _____
Total _____

Qty	Price	Total
_____	\$355	_____
_____	\$495	_____
		<u>6.50</u>



OFS WeatherFAX

6404 Lakewood Court
Raleigh, N.C. 27612
Voice/Fax: 1-919-847-4545



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□ COMPUTERS

Professional quality Computers at discount prices. Ideally suited for use with Weather Satellite systems, at display resolutions up to 1024 x 768 Pixels With Super VGA monitor.

386sx 25MHz 2Mb RAM (expandable to 16Mb) Teac 1.2 or 1.44Mb Floppy drive.
Small footprint high quality metal case, 200W PSU. 4 Free Expansion slots.
14" SVGA Colour monitor (0.28 d.p.), Trident 1Mb (1024x768x256) VGA Card.
40Mb Hard Disk, Latest AMI BIOS. £660.00

486SX-25MHz. 64Kb Cache, 4Mb RAM (expandable to 32Mb). Teac 1.2/1.44Mb drive.
Small footprint high quality metal case, 200W PSU. 4 Free expansion slots.
14" SVGA Colour monitor (0.28 d.p.), Trident 1Mb (1024x768x256) VGA Card.
40Mb Hard Disk, Latest AMI BIOS. £840.00

486DX-33MHz 128Kb Cache, 4Mb RAM (expandable to 32Mb). Teac 1.2/1.44Mb drive.
Small footprint or full AT case, 200W PSU. 4/5 Free expansion slots.
14" SVGA colour monitor (0.28 d.p.), Trident 1Mb (1024x768x256) VGA Card.
40Mb Hard Disk, Latest AMI BIOS. £999.00

□ OPTIONS:

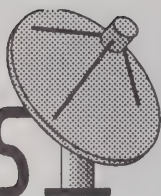
VGA Mono monitor 14" (640 x 480) Less £120
Memory Upgrade per Mb.....ADD £23.75
Tseng Labs ET4000 1Mb VGA Card ADD £36
Mini Tower Case (Leaves 5 free expansion slots) ADD £10
102Mb 15ms Hard Disk..... ADD £80
Serial Mouse.....ADD £20
MS DOS v3.3.....ADD £33
MS DOS V5.0.....ADD £49

□ COMPONENTS:

MOTHERBOARDS : 286-12 £62, 386SX-25 £88, 386DX-40 £179, 486SX-25 £199.
VGA CARDS : Paradise 512kb (640x480x256 colours) £57.00
Trident 1Mb (1024x768x256 colours) £52
Tseng Labs 1Mb (1024x768x256 colours) £88
MONITORS : 14" VGA Mono £86, 14" VGA colour £189
14" Super VGA colour £207, 14" Multiscan Colour £253
FLOPPY DRIVES : TEAC 1.44Mb £35, 1.2Mb £42.50
HARD DISKS : SEAGATE ST351A/X 40mb £128, 102Mb 15ms £209, 125Mb 15ms £244.

Please call for further information on systems and components (Day/Evening)
All prices EXCLUDE VAT. Delivery - 5 Days (Components), 10 Days (Computers).





The Weather Desk

Multi-tasking Weather Satellite Image Gathering System

Spacetechn are pleased to announce the completion of their entirely new weather satellite system for Acorn workstations. It represents a significant advance on anything that is currently available for the decoding and display of analogue weather satellite data. The most significant feature of the new software is that it is fully multi-tasking, allowing up to six different views of the planet to be collected concurrently and still leaving the computer free to be used for other tasks - word processing and so on. This means that you may have: a window with a full resolution view of Europe in infra red; one with the same view in visible light; a view of the whole Earth; a window with the latest admin. message; a window with a zoomed view of the UK with clouds represented in 3D projection and so on. All these views may have many frames so that a time lapse "movie" of the changing weather scene may be shown and what's more, each sequence will be updated automatically as new information comes down from the satellite.

The system is compatible with existing spacetechn hardware and with all current geostationary and polar orbiting meteorological satellites. When used in conjunction with PDSview, true 24 bit colour composite images may be obtained.

All this and you can still run your PC software concurrently! How about running Windows within a window? Don't you wish now you had started out with Acorn? It is not too late to upgrade, we will be pleased to supply you with an A5000 workstation.

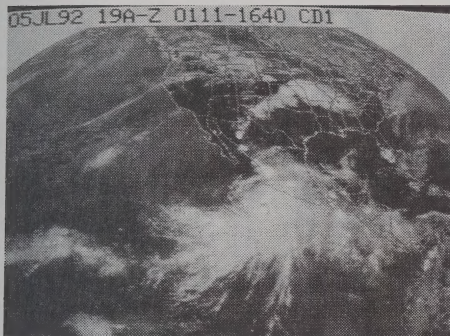
Software only £99.50 ex VAT

Complete Meteosat Station from £949.00 ex VAT

spacetechn
space science resources



21 West Woods, Portland, Dorset DT5 2EA. U.K. ☎ 0305 822753 Fax. 0305 860483



SWAGURSAT

**A SATELLITE
DEMODULATOR
FOR THE
ICOM R7000 or R7100
RECEIVER**

SWAGUR ENTERPRISES HAS DEVELOPED A SPECIAL VIDEO DEMODULATOR WHICH WHEN PLUGGED INTO THE BACK OF YOUR ICOM R7000 or R7100 WILL GIVE YOU FULL RESOLUTION WHEN RECEIVING GEOSTATIONARY OR POLAR ORBITING SATELLITES!

Easy to use. With the patch cord supplied, plug one end into the video demodulator and then plug the other end into your R7000 or R7100 receiver.

You don't have to make do with the 6, 15 or 150KHz of the R7000 or R7100 any longer. Your SWAGURSAT Demodulator will provide the proper bandwidth for satellite reception.

You don't have to take the cover off your R7000 or R7100 since no internal connections are required.

The video demodulator comes complete with power supply and mini plug. Nothing else to buy.

It takes the weak signals from the R7000 or R7100 and amplifies them. It then demodulates them with the proper bandwidth so full resolution of the satellite image can be realized.

A built in speaker amplifier and loudspeaker are provided. A volume control allows you to adjust the volume to a comfortable listening level.

The price of the SWAGURSAT is \$189.00 plus \$8.75 (U.S.) \$25.00 (foreign) shipping and handling.

Please send orders to SWAGUR Enterprises, Box 35, Middleton, WI 53562, or VOICE/FAX phone (608) 592-7409. VISA or MASTER CARDS are accepted.

Are You Being Served ??

Time to take stock

Who supplies the only Guaranteed Pager Proof Receiver ? **TIMESTEP** of course ! **TIMESTEP** continue to supply their top selling **PROscan** receiver via **RIG** at unbelievable prices. We fully back our products with a no-nonsense money back guarantee. When **TIMESTEP** advertises a product it is, a) designed properly, b) works as specified and c) is in stock. What else would you expect ? We design and manufacture, World leading **APT**, **PDUS** and **HRPT** products.

Amiga, Archimedes, Mac II or PC ?

Lots of controversy ? Yes and why not ? But think a moment (1) Which computer will operate **NOAA APT** and gives **Gridding** and temperature calibration ?? only the **PC**, (2) Which computer will give you **HRPT** in 1.1KM resolution in 5 multi spectral bands ??? only the **PC**, (3) Which computer will give you **PDUS** at 2.5 KM resolution in 3 multi spectral bands **EVERY 30 minutes** ????? only the **PC**, (4) Which computer will give you the option to display multi spectral images ????? **THE PC** of course, and the **Archimedes** (but where does the **Archimedes** get it's images from ?) (5) Which computer will resolve images in 1024 x 768 in 256 colours ????? **THE PC** again !!!!! Which will you choose ? **Mac II** ? watch this space.

Multi Spectral View

If you want to look at the best possible imagery you need to combine images from different Spectral Sensors. **MS View** is a new **TIMESTEP** product that will allow you to take 3 band images from **HRPT** and **PDUS** and combine them using a stunning image processor in up to 32 THOUSAND **SIMULTANEOUS** colours. The **PC HRPT** system will now discriminate forest areas from cities. Vegetation indexes can be calculated. We have only just began to find the applications for this professional package. Remarkably it will run on any **ET4000** card with the **Sierra DAC**, the **Orchid Farenheight** card already has one fitted at **NO EXTRA COST !!** So how much is our **MS VIEW** program ?????? £29.95 inc VAT and carriage ?????? **YES !!!!!!!**

Stop press Now the new **Genoa 7900** card supports 640 x 480 in 16 MILLION **SIMULTANEOUS** colours ! Yes, 24 bit true colour ! **Multi Spectral View** has now drivers for this incredible card. The 7900 will also display in 256 grey levels if you really want. The card is available for £150.00 + VAT.

Timestep
Wickhambrook Newmarket
CB8 8QA England
Tel. 0440 820040 Fax. 0440 820281

Timestep HRPT

Noise free digital HRPT transmissions from NOAA, with a ground resolution of just 1.1KM allow images to be received in incredible clarity. Rivers, lakes, mountains, cities and even small towns can be seen on good days.

Image Processing including variable and histogram contrast equalisation combined with full colour editing give the best possible results from any image. Colour enhancement allows sea surface temperature and land details to stand out in high contrast. Any number of colour palettes can be saved for future use. The sophisticated mouse driven software allows all 5 bands to be saved and displayed on nearly all VGA and SVGA cards right up to 1024 pixels, 768 lines and 256 colours.

Zoom to greater than pixel level is available from both a mouse driven zoom box or using a roaming zoom that allows real time dynamic panning.

Latitude and Longitude gridding combined with a mouse pointer readout of temperature in 10 bit data is now provided.



We are offering the complete receiver and PC card for just £499.00, you will need a 1.2M dish (and a way of moving it), a low noise preamplifier, cable and a 286 or better computer with SVGA and a hard drive. This offer is limited. Don't wait, be first !

£499.00

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Timestep PDUS

At last Meteosat Primary Data is available to the amateur. We believe that this is another World First for Timestep ! With the help of Dr John DuBois and Ed Murash we have at a stroke brought low cost digital imagery in to RIG members homes.

The Rev James Brown, Lawrence Harris and Peter Hayes have been the first users. Wait with bated breath for their reviews; if you can !

NOAA, generally acknowledged as the best in imaging, has 4KM resolution on its APT transmission and is very infrequent. PDUS by contrast resolves 2.5KM at the sub-satellite point AND transmits the whole of Europe every 30 minutes. The whole Earth Disc is transmitted at lower resolution every hour. Imagine looking at the River Nile in 2.5KM resolution, the Aswan Dam is clearly visible as the deeper water shows as a much cooler temperature. Remember this is 2.5KM resolution, NOAA APT is 4KM and simply won't show the Nile anyway ! Look at the Amazon, the River Niger, the Volta rivers, Lake Volta, Rain Forests and much, much more !



We are offering the complete receiver and PC card for just £499.00, you will need a 1.6M dish, a low noise preamplifier, cable and a 286 or better computer with SVGA and a hard drive. This offer is limited. Don't wait, be first !

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